TESTING THE WINDOWS-OF-OPPORTUNITY THEORY OF CAPITAL STRUCTURE

By

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Rongbing Huang

This study is dedicated to my parents and my wife.

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Abstract of Dissertation Presented to the Graduate School
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This study examines time-series patterns of external financing decisions. We find that publicly traded U.S. firms fund a larger proportion of their financing deficit with net external equity when the expected equity market risk premium is lower and the first-day returns of initial public offerings are higher. Firms are also more likely to issue equity instead of debt when the closed-end fund discount is smaller, the size discount is larger, past market returns are higher, future market returns are lower, the average announcement effect of seasoned equity offerings is less negative, and the expected default spread is higher. These findings cannot be easily reconciled with the standard pecking-order theory or the static-tradeoff theory, but are consistent with the windows-of-opportunity theory, which suggests that firms prefer external equity when the cost of equity is low, and prefer debt otherwise.

CHAPTER 1
INTRODUCTION

Firms may fund their investment projects with internally generated funds, debt, and/or external equity. What determines their financing decisions? The static-tradeoff theory and the pecking-order theory address this question.

Under the static-tradeoff theory, firms compare the costs and the benefits of debt. The costs of debt include potential bankruptcy costs and agency conflicts between bondholders and shareholders. The benefits of debt include the deductibility of interest expenses and the mitigation of agency conflicts between managers and shareholders. According to the static-tradeoff theory, if firms seek external financing, they should issue equity when their leverage is above the desired target leverage, issue debt when their leverage is below the target, or issue debt and equity proportionately to stay close to the target.

The pecking-order theory proposes that firms follow the standard pecking order in their financing decisions. Firms prefer internally generated funds, and raise external funds only if internal funds are insufficient. If external funds are required, they prefer straight debt, then convertible debt, and finally external equity. Target leverage is of second-order importance under the pecking-order theory. Firms may take "extended excursions away from their targets" because of past profits and losses and their financing needs (Myers (1984)).

How successful are these two theories in explaining the time-series patterns of financing activities? Figure 1-1A shows the average financing activities of publicly

traded U.S. firms from 1963 to 2001, using information from the balance sheet. The average firm increasingly relied on the external capital market over this period. In the choice between debt and equity, firms issued increasingly more external equity relative to debt in the 1990s, violating the standard pecking order.

Figure 1-1A

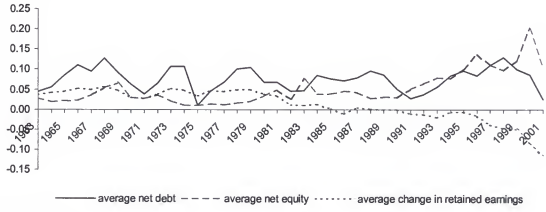

Figure 1-1B

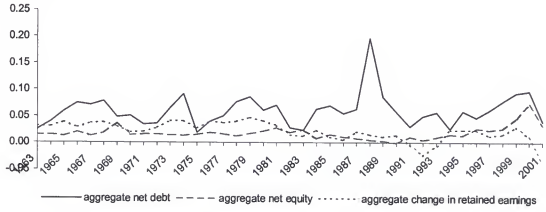

Figure 1-1. Average and aggregate financing activities from the balance sheet. Net debt is the change in debt and preferred stock (Compustat item 181+10-35-79). Net equity is the change in equity and convertible debt (6-181-10+35+79) minus the change in retained earnings (36). The average ratios are the annual averages of net financing scaled by beginning-of-year assets of each firm. The aggregate ratios are the annual aggregate amount of net financing of all firms in the sample scaled by the aggregate amount of beginning-of-year assets. Figure 1-1A presents the average ratios, and Figure 1-1B presents the aggregate ratios.

The averages weigh the financing activities of small firms heavily. To capture the economic significance of large firms, Figure 1-1B shows the aggregate financing activities. At the aggregate level, firms issue more debt than external equity during most years. The aggregate amount of net debt peaked at around 20 percent of aggregate assets of all firms in 1988. The aggregate amount of net external equity peaked at about seven percent of aggregate assets in 2000. Again, this pattern cannot be easily reconciled with the pecking order prediction that equity issues should be a last resort and a rarity. Both the average and aggregate net debt and equity issuance fluctuates substantially. Our study argues that the magnitude of these fluctuations cannot be explained with the static-tradeoff theory either.

A third theory, the windows-of-opportunity theory, has increasingly challenged both the static-tradeoff theory and the pecking-order theory in the last decade. This theory does not assume semi-strong form market efficiency, unlike the other theories. According to the windows-of-opportunity theory, corporate executives sometimes perceive their risky securities as misvalued by the market. Conditional on having financing needs, firms issue equity when they perceive the relative cost of equity as low, and issue debt when they perceive the relative cost of equity as high. The standard pecking order is just a special case. We summarize different financing hierarchies under different scenarios in Table 1-1. Under the windows-of-opportunity theory, firms may issue equity or debt even if they have no immediate financing needs and do not need to adjust their capital structure, because issuing overvalued securities is itself a positive NPV project.

Fama and French (2003) document that equity issues and repurchases have been increasingly frequent and interpret this as evidence against the pecking-order theory.

Table 1-1. Windows-of-opportunity pecking order

Normal conditions	If equity is cheap	If equity is really cheap	If debt is cheap
1) Internal equity	1) Internal equity	1) External equity	1) Debt
2) Debt	2) External equity	2) Internal equity	2) Internal equity
3) External equity	3) Debt	3) Debt	3) External equity

They suggest that new external equity financing tools, such as employee stock option plans, involve lower transaction costs, leading to the increased use of external equity financing over time. However, they do not provide an explanation for why employee stock option plans, which have been around for a long time, have become more popular over time as a way of external equity financing. Furthermore, even within each decade, financing activities show substantial variations that need to be explained.

Like Fama and French (2003), we question the importance of the static-tradeoff theory and the pecking-order theory. Our study also goes one step further. We focus on the year-to-year fluctuations of external financing activities and argue that the windows-of-opportunity theory provides a simple yet powerful explanation for observed time-series patterns of financing decisions. To our knowledge, our study is the first to systematically link the time series of capital structure choices to the time-varying relative cost of equity for a large sample of U.S. publicly traded firms.

We begin with the pecking-order test in Shyam-Sunder and Myers (1999), who run a regression with a firm's change in debt as the dependent variable and its financing deficit as the explanatory variable. Instead of pooling all years together, we run this pecking-order test each year, examine time-series properties of the slope coefficient, and link it to proxies for the time-varying relative cost of equity. Our proxies for the cost of equity include lagged values of the implied equity market risk premium, the average

first-day return of initial public offerings (IPOs), the average closed-end fund discount, the size discount, and the average announcement effect of seasoned equity offerings (SEOs). We also include realized past and future market returns as alternative proxies for the cost of equity.

We find that the time-variation in the relative cost of equity greatly helps explain the changing pecking order behaviors, statistically and economically, even after controlling for macroeconomic conditions. Firms fund a large proportion of their financing deficit with external equity when the cost of equity is low, and fund a large proportion of their financing deficit with debt when the cost of equity is high. For example, an increase in the implied equity market risk premium from three percent to four percent results in approximately three percent more of the financing deficit being funded with net debt. Our finding sheds new light on the time-series properties of corporate financing decisions.

Lemmon and Zender (2002) argue that the weakening pecking order in the 1990s is due largely to the increased proportion of small growth firms among the pool of publicly traded firms. They argue that these small growth firms are debt-constrained, and must fund their growth opportunities with external equity. Our study shows that small growth firms rely heavily on debt financing, and only resort to equity markets when the cost of equity is low. This finding is consistent with the windows-of-opportunity theory rather than the debt market constraints view. Furthermore, excluding small growth firms from our sample does not change our major results.

The static-tradeoff theory stresses the role of target leverage in security issues and buybacks. Changing target leverage could potentially lead to swings of financing

activities. To address this issue, we first estimate target leverage using lagged firm characteristics that are identified by previous studies to be important determinants of capital structure. We then re-run the pecking-order tests controlling for partial adjustment toward target leverage. Because errors could be induced into the estimated target leverage, we also directly include changing firm characteristics in the pecking-order tests. These additional tests do not change our findings.

Chirinko and Singha (2000) question the validity of Shyam-Sunder and Myers' pecking-order tests. To gain more intuition for our regression results, we present scatter-plots of net debt financing versus net external financing for selected years for which the pecking order slope coefficient is especially strong or weak. We also conduct alternative tests. Using pre-issue firm characteristics and market conditions, we estimate logit and multinomial logit regressions to predict the propensity to issue equity. We find stronger support for the windows-of-opportunity theory based on the relative costs of debt versus equity. Firms are more likely to issue equity instead of debt when the implied equity market risk premium is lower, the first-day return of IPOs is higher, the closed-end fund discount is smaller, the size discount is larger, past market returns are higher, future market returns are lower, the average announcement effect of SEOs is less negative, and the expected default spread is higher.

CHAPTER 2
LITERATURE REVIEW

In the perfect world of Modigliani and Miller (1958) with no frictions such as transaction costs and taxes, capital structure is irrelevant. Miller (1977) and Miller and Scholes (1978) confirm the irrelevance of capital structure even when there are taxes. Other theories have been developed through adding back frictions.

Static-Tradeoff Theory

The static-tradeoff theory focuses on the tradeoff between the cost of debt and the benefit of debt. Evidence supporting the static-tradeoff theory is mixed. On the one hand, evidence suggests that target leverage, if it exists, is not important. Many studies find that higher profitability leads to lower leverage, inconsistent with the tradeoff prediction that more profitable firms should borrow more to reduce their tax liabilities (for example, Titman and Wessels (1988), Rajan and Zingales (1995), and Fama and French (2002b)). Graham (2000) estimates the cost and benefit of debt, and finds that large, liquid, profitable firms with low expected distress costs use debt conservatively.[1] One classic example is Microsoft, which has been very profitable and has maintained a zero-debt policy. Surveyed corporate executives also indicate that their target leverage is soft (Graham and Harvey (2001)). Jalilvand and Harris (1984) and Fama and French (2002b) show that the speed of adjustment toward target leverage is slow. Welch (2004) finds that

[1] Graham (2003) reviews the literature on taxes and capital structure.

prior stock returns are the main determinant of market leverage, and firms do not actively offset the effects of stock returns on their capital structure.

On the other hand, several studies support the tradeoff theory. Marsh (1982), Hovakimian, Opler, and Titman (1999), Korajczyk and Levy (2003), Hovakimian (2004), and Hovakimian, Hovakimian, and Tehranian (2004) confirm the role of target leverage in security issues and repurchases. Frank and Goyal (2003) examine the relative importance of 39 factors in leverage decisions, and argue in favor of the tradeoff theory. Flannery and Rangan (2003) disagree with Welch and find that firms quickly offset the effects of prior stock price movements when target market leverage is allowed to vary with firm characteristics. Leary and Roberts (2004) show that firms are inactive with respect to their financial policy most of the time, but do issue or buy back securities in clusters to adjust toward target leverage.

Pecking-Order Theory

The pecking-order theory is formally proposed in Myers (1984) and Myers and Majluf (1984). In the theoretical framework of Myers and Majluf, investors are willing to buy risky securities only at a discount because of the information asymmetry between managers and outside investors. Expecting this problem, managers prefer internally generated funds. External funds are raised only when internal funds are insufficient. When external funds have to be raised, firms prefer straight debt, then convertible debt, with external equity issued as a last resort. Although the information asymmetry in Myers and Majluf is one potential reason, the standard pecking order may arise for other reasons. Donaldson (1961) cites transaction costs. The preference for debt over equity could also be driven by managerial optimism (Lee (1997), Heaton (2002), and Hackbarth (2003)). Optimistic entrepreneurs are unwilling to issue external equity because they

think their stock is undervalued. Graham (1999) finds that the majority of corporate executives surveyed believed that their common equity was undervalued even when the Dow was approaching 10,000 in 1999.

Empirical tests of the pecking-order theory only started to receive attention more than ten years after the theory was formally proposed. Helwege and Liang (1996) find that the decision to raise external capital is unrelated to the shortfall in internally generated funds for a sample of firms that went public in 1983, inconsistent with the pecking-order theory. Shyam-Sunder and Myers (1999) provide an influential empirical test of the pecking-order theory against the tradeoff theory. Using a sample of 157 firms that had traded continuously from 1971 to 1989, they find that the basic pecking order model, which predicts external debt financing driven by the financing deficit, has much greater explanatory power than the static tradeoff model. Chirinko and Singha (2000) question the validity of the simple pecking-order tests of Shyam-Sunder and Myers by showing that the tests may generate misleading inferences when evaluating plausible patterns of external financing. Fama and French (2002b) find that more profitable firms are less levered, consistent with the pecking order model. Frank and Goyal (2003) extend the pecking-order tests for a much larger sample of U.S. firms, and find that net equity issues track the financing deficit more closely, especially in the 1990s. Lemmon and Zender (2002) argue that the large proportion of debt-constrained small growth firms weakens the standard pecking order in the 1990s. Fama and French (2003) challenge the pecking-order theory by showing that firms frequently issue and repurchase equity. They suggest that transaction costs are the driving force of financing decisions.

Windows-of-Opportunity Theory

The static-tradeoff theory and the pecking-order theory implicitly assume semi-strong form market efficiency. What if capital markets are inefficient? If firms seek to minimize their cost of capital, market inefficiencies have important implications for corporate financing (Stein (1996)). A large literature on long-run stock performance suggests market inefficiency at the firm level (Ritter (1991), Loughran, Ritter, and Rydqvist (1994), Lerner (1994), Loughran and Ritter (1995), Spiess and Affleck-Graves (1995), Ikenberry, Lakonishok, and Vermaelen (1995), Loughran and Vijh (1997), Billett, Flannery and Garfinkel (2001), and Hertzel, Lemmon, Linck and Rees (2002)).[2]

Market inefficiency also receives support at the industry level and the market level. Marsh (1982) shows that firms are more likely to issue equity when equity market conditions are favorable. Loughran, Ritter, and Rydqvist (1994) document IPO clustering for 15 countries, and find that IPO volume is positively correlated with the inflation-adjusted level of the stock market in 14 of them. Pagano, Panetta, and Zingales (1998) note that the most important determinant of Italian firms' going-public decision is the industry's market-to-book ratio. They argue that the ratio is a proxy for mispricing rather than growth opportunities. Baker and Wurgler (2000) find that the share of equity in aggregate securities issuance predicts aggregate stock-market returns. Lowry (2003) shows that the volume of IPOs is largely determined by proxies for investor sentiment.

In practice, corporate executives seem to be actively engaged in market timing in their financing decisions. Two thirds of corporate executives agree that "the amount by

[2] See Table 6 in Ritter (2003) for recent studies in this area.

which our stock is undervalued or overvalued was an important or very important consideration" in equity issue decisions in surveys by Graham and Harvey (2001).

The windows-of-opportunity theory does not rely on the assumption of market inefficiency. Windows of opportunity exist as long as the relative cost of equity varies over time. Most of the literature relies on realized returns to estimate the cost of equity. However, Fama and French (1997) conclude that the estimation of the cost of equity using realized returns is "unavoidably imprecise" because of the difficulty in identifying the right asset-pricing model and the imprecision in the estimation of factor loadings and factor risk premia. Furthermore, what happened in the past does not necessarily repeat itself in the future. An alternative approach estimates the implied equity risk premium with valuation models using accounting fundamentals (for example, Claus and Thomas (2001), Gebhardt, Lee, and Swaminathan (2001), Ritter and Warr (2002), and Fama and French (2002a)). Although there could be plausible rational and irrational explanations for the time-variation in the expected equity risk premium, academics tend to agree that the expected equity risk premium has declined over the last several decades. The windows-of-opportunity theory simply argues that the time-variation in the relative cost of equity, whether it is due to rational or irrational investors, has important implications for capital structure choices.

Only recently has empirical work started to directly link the cost of equity to capital structure. Baker and Wurgler (2002) find that an external finance-weighted average of historical market-to-book ratios is negatively related to current leverage, and they interpret this as evidence for market timing. Aydogan (2003), Hovakimian (2003), and

Kayhan and Titman (2003) confirm the existence of market timing, though they disagree with Baker and Wurgler on the persistent effect of market timing on capital structure.

CHAPTER 3
DATA AND SUMMARY STATISTICS

Data

The firm-level data are from CRSP and Compustat. The sample consists of firms from 1963 to 2001. To be included in the sample for calendar year t, a firm must have total assets (Compustat item 6), total liabilities (181) and retained earnings (36) for the fiscal years ending in calendar years t-1 and t. Firms must also have CRSP share codes of 10 or 11, and stock price (199) and shares outstanding (25) for the fiscal year ending in calendar year t-1 to ensure that they are publicly traded. IPO firms are thus excluded from the sample. Missing R&D (46), capital expenditures (30), and convertible debt (79) are set to zero to avoid losing most observations in the analyses

Utilities (4900-4949) and financial firms (6000-6999) are excluded because they were regulated during most of the sample period. A small number of firms with a format code of 4, 5, or 6 are also excluded from the sample.[3] When a firm is involved in a major merger as defined in Compustat (footnote code of AB), the corresponding year is excluded. The balance sheet and cash flow variables are scaled by the book value of total assets.[4] Firm years with beginning book assets of less than 10 million, measured in terms of dollars of 1998 purchasing power, are also excluded to further reduce the effect of outliers because of scaling.

[3] Format code 5 is for Canadian firms, and format codes 4 and 6 are not defined in Compustat.

[4] The most extreme one percent values in either tail of the distribution are winsorized after scaling.

Summary Statistics of Firm Characteristics

Summary statistics of firm characteristics are presented by year because our study concerns the time-series properties of financing activities. Figure 1-1 presents financing activities using information from the balance sheet. Net debt is defined as the change in book debt. Net equity is defined as the change in book equity minus the change in retained earnings. Following Baker and Wurgler (2002) and Fama and French (2002b), book debt is defined as total liabilities plus preferred stock (10) minus deferred taxes (35) and convertible debt (79), and book equity is total assets less book debt. When preferred stock is missing, it is replaced with the redemption value of preferred stock (56). When the redemption value is also missing, it is replaced with the carrying value of preferred stock (130).

In Figure 1-1, the average ratios are the annual averages of net financing scaled by beginning-of-year assets, and the aggregate ratios are the annual aggregate amount of net financing of all firms scaled by the aggregate amount of beginning-of-year total assets. The average ratios weigh small firms heavily, while the aggregate ratios weigh large firms heavily. Focusing on the average ratios misses the economic significance of large firms, while focusing on the aggregate ratios misses the financing behavior of small firms. The average net debt increase exceeded 10 percent of beginning-of-year assets in 1966, 1968, 1973-74, 1978-79, and 1997-98. The average net equity issuance exceeded six percent in 1969, 1983, and 1992-2001. The pecking-order theory gains some support during 1974-78, when the average percent of net equity issuance was below two percent. The aggregate amount of net debt issuance exceeded seven percent of the aggregate assets in 1966-68, 1974, 1978-79, 1981, 1988-89, and 1998-2000. The aggregate amount

of net equity issuance exceeded two percent in 1966, 1969, 1980-81, 1983, and 1996-2001.

The pecking-order theory predicts that equity issues should be rare. However, during most years from 1991 to 2001, the average ratio of net equity issuance was more than the average ratio of net debt issuance, inconsistent with the pecking-order theory. Even at the aggregate level, net equity issuance was over four percent of assets in 1999, and over seven percent of assets in 2000. Why did the standard pecking order appear to be more seriously violated in 1999-2000? Was this a special era? Our study shows that the cost of equity was particularly low during this period.

Figure 1-1 uses information from the balance sheet. Alternatively, the financing deficit and net security issues and buybacks can be defined using information from the statement of cash flows (Fama and French (2002b), Lemmon and Zender (2002) and Frank and Goyal (2003)). One problem with this approach is that non-cash transactions, such as exchange offers, do not show up in the statement of cash flows.[5] Fama and French (2003) also point out that the statement of cash flows does not show stock issued in mergers. Our sample excludes firm years when a major merger occurs and therefore ignores net equity and debt issues due to major mergers. Thus, our numbers may underestimate the extent of external financing.

Figure 3-1 presents financing activities using information from the statement of cash flows to get a sense of how much the statement of cash flows understates security issues and buybacks. The difference between the balance sheet and the statement of cash

[5] For example, Apple Computer issued common equity of $654 million, about 15 percent of its beginning-of-year assets of $4.3 billion, for redemption of its long-term debt in 1999. This transaction showed up on its balance sheet, but did not show up on its statement of cash flows.

flows is large. For example, in 2000, the average percent of net equity peaked at about 12 percent in Figure 3-1, compared with about 20 percent in Figure 1-1. In Figure 1-1, the aggregate percent of net equity to assets peaked at 7.1 percent in 2000, while it was only 0.5 percent in the same year in Figure 3-1. Because of the difference between the balance sheet and the statement of cash flows, we check our results in Chapter 4 using the statement of cash flows in unreported analyses. No major results are affected.

Figures 1-1 and 3-1 understate net security issues and buybacks because they are mixed together. For example, the average percent of net equity can be near zero if net equity repurchases by some firms offset net equity issues by other firms. Figure 3-2 separates net security issues from net security buybacks. Each year, firms are categorized into five net equity issue groups and five net debt issue groups according to the net amount of equity or debt issuance scaled by beginning-of-year assets, respectively. Our efforts are justified. Once we separate net security issues from net security buybacks, the pecking order theory receives little support. We see much more frequent financing activities. Figure 3-2A is plotted for all firms, and Figure 3-2B is for small growth firms. In Figure 3-2A, the proportion of firms with net debt issuance of at least five percent of assets was never below 28 percent. The pecking-order theory predicts the rarity of equity issues. However, the proportion of equity issuers (firms issuing a least five percent of assets) peaked at over 34 percent in 1969, was at least 25 percent from 1995 to 2001, and was never below 6.7 percent.

Since small growth firms are more likely to require external funds, Figure 3-2B presents the proportions of debt and equity issuers among small growth firms. Small

Figure 3-1A

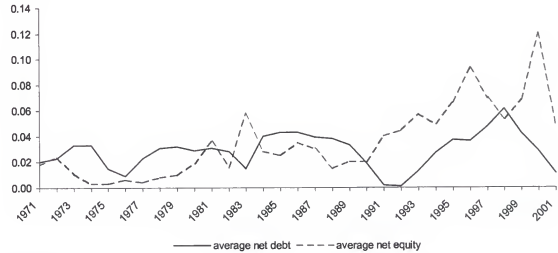

Figure 3-1B

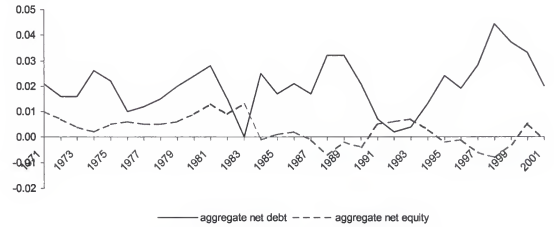

Figure 3-1. Average and aggregate financing activities from the statement of cash flows. Net debt is the net debt issuance from the statement of cash flows (Compustat item 111-114-301 for firms with format code 1, 111-114+301 for firms with format codes 2, 3, and 7). Net equity is the net equity issuance from the statement of cash flows (108-115). The average ratios are the annual averages of net financing scaled by beginning-of-year assets of each firm. The aggregate ratios are the annual aggregate amount of net financing of all firms in the sample scaled by the aggregate amount of beginning-of-year assets. Figure 3-1A presents the average ratios, and Figure 3-1B presents the aggregate ratios.

Figure 3-2A

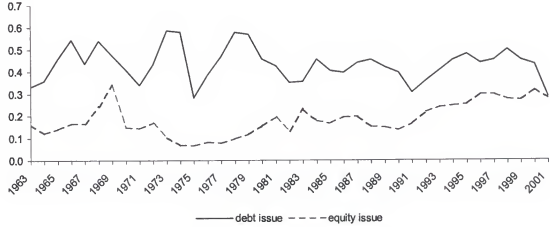

Figure 3-2B

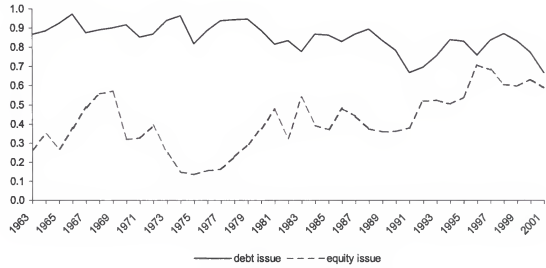

Figure 3-2. Proportions of debt and equity issues. ΔD is the change in debt and preferred stock (Compustat item 181+10-35-79). ΔE is the change in equity and convertible debt (6-181-10+35+79) minus the change in retained earnings (36). A firm is defined as issuing debt if $\Delta D/A_{t-1} \geq 0.05$. Similarly, a firm is defined as issuing equity if $\Delta E/A_{t-1} \geq 0.05$. Figure 3-2A is for all firms, and Figure 3-2B is for small growth firms.

Table 3-1. Median firm characteristics

Year	N	A	SALE	Q	ΔA/A (%)	ΔSALE (%)	OIBD (%)	CAPEX (%)	TANG (%)
1963	129	249.7	329.4	1.16	6.4	8.1	16.0	4.9	43.2
1964	467	412.6	461.7	1.23	7.4	8.8	15.8	5.1	35.8
1965	557	417.6	517.9	1.37	10.3	10.8	16.2	6.1	35.1
1966	715	363.5	498.6	1.19	13.0	12.5	16.2	6.7	34.9
1967	1313	271.2	353.1	1.46	9.9	7.6	15.4	6.5	34.5
1968	1556	256.0	340.7	1.66	13.6	11.7	15.6	6.0	31.8
1969	1913	216.0	295.8	1.33	12.2	11.4	14.9	6.6	31.5
1970	2205	197.3	261.8	1.11	7.6	6.7	13.6	6.2	32.2
1971	2489	181.7	247.0	1.21	6.1	6.8	13.1	4.9	31.9
1972	2741	175.4	235.4	1.20	9.2	12.2	13.9	5.3	31.1
1973	2975	165.6	236.3	0.93	13.3	16.4	14.8	6.2	30.3
1974	3025	163.8	235.8	0.81	13.0	16.5	15.3	6.2	30.2
1975	3097	151.5	218.7	0.86	3.8	5.7	14.7	5.3	30.9
1976	3042	158.3	234.6	0.93	8.5	11.7	15.9	5.1	30.1
1977	2979	163.4	248.9	0.93	10.2	11.8	16.0	5.9	30.5
1978	2871	171.3	262.2	0.96	13.1	14.2	16.6	6.4	30.8
1979	2892	158.5	243.0	0.98	13.7	14.9	16.3	6.9	30.9
1980	2956	140.1	213.8	1.00	10.1	11.2	15.2	7.0	31.5
1981	2886	137.7	203.4	1.01	9.6	9.3	14.7	6.7	31.9
1982	3076	123.3	159.5	1.02	4.3	2.8	12.8	6.3	33.2
1983	3061	123.8	150.6	1.21	6.8	5.6	12.6	5.5	31.5
1984	3129	122.2	152.2	1.13	8.9	12.5	13.6	6.5	31.3
1985	3186	111.3	137.4	1.19	6.5	6.7	12.2	6.3	31.4
1986	3078	117.9	135.8	1.23	5.8	6.2	11.4	5.6	30.4
1987	3080	117.6	137.4	1.21	7.1	9.7	12.0	5.2	28.7
1988	3184	117.4	137.1	1.19	7.7	12.0	12.0	5.4	28.1
1989	3124	121.4	146.5	1.24	6.7	9.1	12.0	5.1	27.7
1990	3045	123.0	151.3	1.11	5.1	7.1	12.1	5.2	28.0
1991	3043	119.7	147.1	1.19	2.3	3.0	11.7	4.5	28.0
1992	3132	114.6	143.2	1.30	4.0	6.1	12.1	4.5	27.4
1993	3366	113.8	136.0	1.43	5.6	7.2	11.9	4.7	25.6
1994	3711	117.8	140.1	1.39	8.8	11.2	12.4	5.1	25.1
1995	3945	119.8	144.2	1.46	10.0	12.6	12.5	5.2	24.2
1996	4191	121.0	144.8	1.50	8.8	10.9	12.2	5.0	23.3
1997	4552	119.4	134.3	1.58	8.0	10.9	11.8	4.9	22.1
1998	4582	131.3	142.1	1.42	8.3	10.0	11.0	4.9	21.5
1999	4375	143.4	150.6	1.36	6.2	8.9	10.6	4.4	21.0
2000	4210	158.7	156.6	1.24	5.6	10.7	10.3	4.3	20.4
2001	4174	153.3	144.6	1.32	-1.8	2.3	8.0	3.7	19.6

A is the book value of total assets (Compustat item 6) in millions of constant 1998 dollars. SALE is the net sales (12) in millions of constant 1998 dollars. Q is the market-to-book ratio of assets, where the market value of assets is defined as the book value of total assets minus the book value of equity plus the market value of equity (Compustat item 181+10-35+25*199). ΔA/A is the change in total assets divided by beginning-of-year assets. ΔSALE is the change in the log of net sales. OIBD is the operating income before depreciation (13) scaled by assets. CAPEX is the capital expenditure (128) scaled by assets. TANG is the PPE (8) scaled by assets.

growth firms rely heavily on external debt. During all years, over 66 percent of them raised external debt of at least five percent of beginning-of-year assets. However, small growth firms do not always rely on external equity. Less than 17 percent of them raised equity of at least five percent of assets in each of the years 1974-77 (cold equity markets), while more than 54 percent of them did so each year in 1968-69, 1983, and 1996-2001 (hot equity markets).

Table 3-1 reports the median firm characteristics for all firms in our sample. The median asset growth, net sales growth, and capital expenditures do not show a clear time trend. The median total assets, net sales, profitability, and tangibility have declined. The market-to-book ratio for assets, often used as a proxy for Tobin's Q, is defined as book assets to market assets. It was below one from 1973 to 1979 and above one during other years.

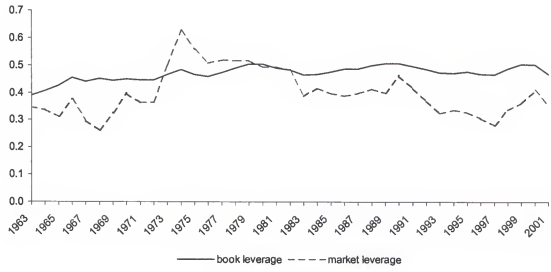

Figure 3-3. Median leverage. Book leverage is defined as the book value of debt (Compustat item 181+10-35-79) divided by the book value of assets. Market leverage is defined as the book value of debt divided by the market value of assets. The market value of assets is defined as the book value of total assets minus the book value of debt plus the market value of equity (181+10-35+25*199).

Figure 3-3 plots the median book and market leverage. Book leverage is defined as book debt to total assets. Market leverage is defined as book debt to market assets. The median book leverage is quite stable, hovering around 45 percent. The median market leverage, however, fluctuates over time. It was below the median book leverage in the 1960s, above the median book leverage in most of the 1970s, and below the median book leverage in the 1980s and the 1990s. This pattern is consistent with the conjecture of Welch (2004) that firms do not quickly rebalance away the effects of stock returns on their market leverage. As pointed out in Flannery and Rangan (2003), however, it is necessary to consider the possibility that target leverage has changed due to changing firm characteristics.

Overall, our summary statistics of firm characteristics cast doubt on the pecking-order theory and call for an alternative explanation for changing financing activities.

Summary Statistics of Time-Series Variables

Table 3-2 reports summary statistics of time-series variables. Our first proxy for the cost of equity is the lagged implied equity market risk premium, estimated using analyst forecasts at the year-end for the 30 stocks in the Dow Jones Industrial Average from Value Line for 1968-1976 and from I/B/E/S for 1977-2001.[6] The implied equity risk

[6] Our study closely follows Ritter and Warr (2002) and corrects for inflation-induced distortions in the estimation of the implied equity risk premium. We hand-collected Value Line data from *Value Line Investment Survey* for early years when the I/B/E/S database was not available. Because previous studies document that I/B/E/S and Value Line analysts make systematically different forecasts, we estimate the implied equity risk premium for 1977 using analyst forecasts from both sources and then adjust the implied equity risk premia for 1968-1976 by multiplying the ratio of the 1977 premium using I/B/E/S and the 1977 premium using Value Line. Brav, Lehavy, and Michaely (2003) estimate the implied equity risk premium using target prices and future dividends from Value Line for 1975-2001. Using their series instead does not change our major results.

Table 3-2. Summary statistics of time-series variables, 1963-2001

	ERP_{t-1}	$RIPO_{t-1}$	$CEFD_{t-1}$	EWR_{t-1}	EWR_{t+1}	SMB_{t-1}	$SEOAR_{t-1}$	$TAXR_t$	$RGDP_t$	$UPTURN_t$	$INFLAT_t$	$DEFSP_{t-1}$
N	33	39	39	39	39	39	21	39	39	39	39	39
Mean	0.031	0.176	0.088	0.158	0.161	0.026	-0.018	0.430	0.033	0.872	0.047	0.011
Std Dev	0.037	0.161	0.081	0.260	0.258	0.149	0.005	0.067	0.022	0.339	0.031	0.005
Min	-0.043	-0.017	-0.104	-0.356	-0.356	-0.239	-0.028	0.340	-0.020	0.000	0.010	0.003
Median	0.037	0.135	0.097	0.188	0.202	0.004	-0.017	0.460	0.036	1.000	0.038	0.009
Max	0.114	0.695	0.237	0.774	0.774	0.506	-0.008	0.528	0.073	1.000	0.133	0.023
Correlations												
ERP_{t-1}	1											
$RIPO_{t-1}$	-0.42[b]	1										
$CEFD_{t-1}$	0.33[c]	-0.21	1									
EWR_{t-1}	-0.09	0.33[b]	0.04	1								
EWR_{t+1}	0.29	-0.26	0.29[c]	-0.18	1							
SMB_{t-1}	0.23	0.38[b]	0.04	0.80[a]	-0.08	1						
$SEOAR_{t-1}$	0.19	0.23	0.28	0.41[c]	0.23	0.22	1					
$TAXR_t$	0.71[a]	-0.12	0.11	0.09	0.03	0.30[c]	0.42[c]	1				
$RGDP_t$	-0.18	-0.08	-0.01	0.49[a]	-0.20	0.27[c]	0.08	0.16	1			
$UPTURN_t$	0.07	-0.21	-0.18	0.19	-0.07	0.32[b]	-0.05	0.05	0.25	1		
$INFLAT_t$	0.56[a]	0.07	0.48[a]	0.06	0.23	0.16	0.36	0.32[c]	-0.27[c]	-0.36[b]	1	
$DEFSP_{t-1}$	0.48[a]	-0.07	0.02	-0.03	-0.08	-0.02	0.39[c]	0.13	-0.36[b]	-0.01	0.15	1

ERP is the implied market equity risk premium at the year-end, estimated using analyst forecasts for the Dow 30 stocks from Value Line for 1968-1976 and from I/B/E/S for 1977-2001. RIPO is the annual average of initial returns of initial public offerings from Jay Ritter at http://bear.cba.ufl.edu/ritter/ipodata.htm. CEFD is the value-weighted average of the closed-end fund discount at the year-end from Malcolm Baker and Jeffrey Wurgler, who construct the series by combining several sources (Neal and Wheatley, 1962-1993; CDA/Weisenberger, 1994-1998; and the *Wall Street Journal*, 1999-2001). EWR is the equally weighted market returns from CRSP. SMB is the difference in the average return on portfolios of small stocks and portfolios of big stocks from Kenneth French. SEOAR is the annual average of market-adjusted returns from one day before to one day after the file date of seasoned equity offerings (SEOs) from Thomson Financial. The average announcement effect is calculated from 1980, the first year the file date is available for most SEOs. TAXR is the statutory corporate tax rate. RGDP is the real GDP growth rate from the Bureau of Economic Analysis, Department of Commerce. UPTURN equals one for years between a "trough" and a "peak" declared by NBER, and zero for other years. INFLAT is the inflation rate from CRSP. DEFSP is the default spread calculated as the yield difference between Moody's Baa rated and Aaa rated corporate bonds at the year-end. The subscripts denote years. The superscripts a, b, and c denote statistical significance at the 1%, 5%, and 10% levels in a two-tailed test.

premium is defined as the internal rate of return that equates the current stock price to the present value of all future cash flows to common shareholders of the firm minus the risk-free rate (the return on one-month Treasury bills from Ibbotson Associates). The equally weighted average of the implied equity premium of the Dow 30 stocks is used as an estimate of the equity risk premium for the market. The time-variation of the implied equity market equity risk premium may be due to either the time-variation of risk aversion of investors (a rational reason) or the time-variation of investor sentiment (an irrational reason).

If investors occasionally become overly optimistic, then the cost of equity for firms is low. The average first-day return of IPOs and the closed-end fund discount are two well-known proxies for investor sentiment. The first-day returns of IPOs are sensitive to investor sentiment because IPO firms have no observable market price prior to the offering, and many of them have little operating history and face a lot of uncertainties (Ibbotson, Sindelar, and Ritter (1994), and Lowry and Schwert (2002)). The discount on a closed-end fund is the difference between its net asset value (NAV) and market price as a fraction of its NAV. The average discount is the value-weighted average of discounts on closed-end funds.[7] Lee, Shleifer, and Thaler (1991) find that closed-end funds are mostly held by individual investors, and argue that investor sentiment explains much of the variation of the discount. When their sentiment is high, investors pay relatively more for shares of closed-end funds, and the discount is smaller.

We use realized market returns as alternative proxies for the cost of equity. Lowry (2003) uses future market returns as a proxy for investor sentiment and finds that there is

[7] We thank Jeffrey Wurgler for providing the average discount on closed-end funds.

a negative relation between IPO volume and future market returns. Schultz (2003) interprets low market returns after heavy equity issuance as pseudo market timing. We argue that the negative relation between equity issuance and future market returns can also be explained with changes in the cost of equity. If the implied equity market risk premium falls, then future stock-market returns should be low in a reasonably efficient market. Korajczyk, Lucas, and McDonald (1990) document that aggregate equity issuance is positively related to past stock-market performance. Although there are other possible explanations, we argue that past market returns may reflect changes in the cost of equity. A stock market run-up may occur if the equity premium falls.

We also include the lagged size discount, defined as the difference in the lagged average return on portfolios of small stocks and portfolios of big stocks, because it may also measure investor sentiment toward small stocks. Choe, Masulis, and Nanda (1993), Bayless and Chaplinsky (1996), and Korajczyk and Levy (2003) find that firms are more likely to conduct seasoned equity offerings when the announcement effects are less negative. We thus include the lagged average announcement effect in our regressions to see how important it is as a measure for the cost of equity.

Our control variables include inflation, the statutory corporate tax rate, the real GDP growth rate, a business-expansion dummy, and the lagged default spread. The statutory corporate tax rate has changed over time and may have major influence on financing decisions of U.S. firms.[8] The business-expansion dummy is constructed using "trough" and "peak" declared by the National Bureau of Economic Research (NBER).

[8] The statutory corporate tax rate was 52 percent in 1963, 50 percent in 1964, 48 percent from 1965-67, 52.8 percent from 1968-69, 49.2 percent in 1970, 48 percent from 1971-78, 46 percent from 1979-86, 40 percent in 1987, 34 percent from 1988-92, and 35 percent from 1993-2001.

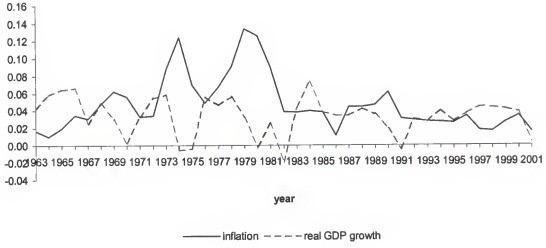

Figure 3-4. Inflation and real GDP growth. Inflation is the growth rate of the consumer price index. Real GDP growth is the real growth rate of gross domestic products.

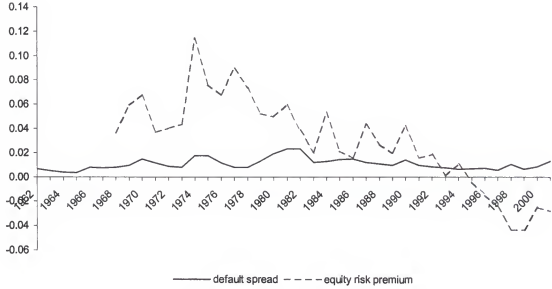

Figure 3-5. Equity risk premium and default spread. The market equity risk premium is estimated using analyst forecasts at the year-end for the Dow 30 stocks from Value Line for 1968-1976 and from I/B/E/S for 1977-2001. The default spread is the yield difference at the year-end between Moody's Baa and Aaa rated bonds.

The real GDP growth rate and the business expansion dummy control for growth opportunities. The default spread, defined as the yield difference between Moody's Baa rated and Aaa rated corporate bonds at the year-end, is used as a proxy for the cost of debt.

Inflation and the real rate of GDP growth are plotted in Figure 3-4. Inflation was below seven percent during the 1960s, rose above eight percent from 1973-74 and 1978-81, and then fell below seven percent during 1982-2001, a long period of low inflation. Inflation peaked at over 13 percent in 1979, and bottomed out at about one percent in 1964 and 1986. The real rate of GDP growth ranges from -2 percent in 1982 to over seven percent in 1984.

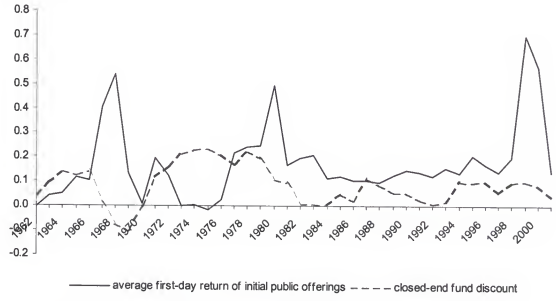

Figure 3-6. Average first-day return of IPOs and closed-end fund discount. The annual average of first-day returns of initial public offerings is from Jay Ritter. The closed-end fund discount is the value-weighted average of closed-end fund discounts at the year-end from Malcolm Baker and Jeffrey Wurgler, who construct the series by combining several sources (Neal and Wheatley, 1962-1993; CDA/Weisenberger, 1994-1998; and the *Wall Street Journal*, 1999-2001).

Figure 3-5 shows the equity market risk premium and the default spread at the year-end. The equity risk premium fluctuates dramatically, while the default spread shows less fluctuation. The implied equity risk premium turned negative from 1995-2001, suggesting overvaluation of the stock market. The average first-day return of IPOs and the closed-end fund discount are plotted in Figure 3-6. The average first-day return of IPOs fluctuates dramatically, ranging from –1.7 percent in 1975 to 69.5 percent in 1999. The historical low of the closed-end fund discount was -10 percent in 1969, and the historical high was 24 percent in 1975. These figures suggest that the implied equity market risk premium is positively correlated with the closed-end fund discount, and is negatively correlated with the average first-day return of IPOs. In 1974 when the implied equity market risk premium peaked at 11.4 percent, the closed-end fund discount was around 23 percent, while the average first-day return of IPOs was near zero. In 1999 when the implied equity premium dropped below negative four percent, the average first-day return of IPOs reached over 69 percent.

The time-series of cost-of-equity proxies appear to be related to the time-series of financing activities, leading to the formal exploration of the relation between financing activities and the time-varying cost of equity in the next chapter.

CHAPTER 4
RESULTS

This chapter reports and discusses the results from pecking order regressions for the proportion of the financing deficit funded with net debt, time-series regressions linking the pecking-order slope coefficient to the time-varying cost of equity, logit regressions for the choice between debt and equity issues, and multinomial logit regressions for the joint decision of whether to issue securities and which security to issue.

Pecking-Order Tests

Following Shyam-Sunder and Myers (1999), we first estimate

$$\Delta D_{it} = a_t + b_t DEF_{it} + u_{it}, \tag{4-1}$$

where ΔD_{it} is the change in book debt scaled by beginning-of-year assets for firm i at the end of the fiscal year ending in calendar year t, and DEF_{it} is the change in assets minus the change in retained earnings scaled by beginning-of-year assets. Instead of pooling all firm years together, we estimate this equation each year and report the results in Table 4-1. The estimated coefficient, $\hat{b}$, shows very interesting time-series patterns. It ranges from 0.67 to 0.92 in the 1960s and the 1970s, from 0.41 to 0.82 in the 1980s, and from 0.21 to 0.61 from 1990 to 2001. The historical high was 0.92 in 1974, and the historical low was 0.21 in 2000. Frank and Goyal (2002) find that the coefficient was low in the 1990s as well. However, a time trend does not explain everything. Even within each decade, there are ups and downs that need to be explained.

Table 4-1. Pecking-order tests

Year	b_t	$t(b_t)$	a_t	$t(a_t)$	N	Adj. R^2
1963	0.733	20.57	-0.008	-1.50	129	0.767
1964	0.797	58.03	-0.004	-1.69	467	0.878
1965	0.874	67.85	-0.008	-3.09	557	0.892
1966	0.907	94.20	-0.011	-4.44	717	0.925
1967	0.674	66.72	0.006	1.84	1316	0.772
1968	0.721	88.06	-0.003	-0.92	1560	0.833
1969	0.743	96.97	-0.025	-10.16	1917	0.831
1970	0.779	95.41	-0.009	-5.00	2213	0.804
1971	0.707	92.47	-0.008	-5.03	2496	0.774
1972	0.678	95.56	-0.004	-2.12	2750	0.769
1973	0.807	139.38	0.004	2.64	2989	0.867
1974	0.923	277.36	-0.002	-2.04	3043	0.962
1975	0.908	195.31	-0.009	-12.69	3111	0.925
1976	0.879	181.87	-0.006	-7.32	3051	0.916
1977	0.915	204.04	-0.006	-6.49	2991	0.933
1978	0.871	180.69	-0.002	-1.62	2887	0.919
1979	0.846	139.71	-0.001	-0.60	2907	0.870
1980	0.746	114.90	-0.007	-4.28	2972	0.816
1981	0.640	80.43	-0.006	-2.72	2899	0.691
1982	0.788	124.21	-0.010	-6.40	3095	0.833
1983	0.412	55.08	-0.004	-1.24	3078	0.496
1984	0.691	103.74	-0.001	-0.23	3150	0.774
1985	0.722	113.75	-0.006	-2.78	3211	0.801
1986	0.644	83.73	-0.005	-1.92	3099	0.693
1987	0.735	103.94	-0.010	-4.08	3099	0.777
1988	0.822	136.86	-0.005	-2.41	3202	0.854
1989	0.789	131.79	-0.007	-3.26	3139	0.847
1990	0.606	81.26	0.002	0.91	3067	0.683
1991	0.401	48.74	-0.004	-1.65	3065	0.437
1992	0.394	49.62	-0.003	-1.15	3161	0.438
1993	0.421	55.66	-0.001	-0.28	3395	0.477
1994	0.489	71.90	0.006	2.22	3742	0.580
1995	0.395	62.39	0.019	5.92	3973	0.495
1996	0.302	51.50	0.016	4.74	4222	0.386
1997	0.474	83.25	0.005	1.68	4585	0.602
1998	0.480	81.92	0.021	6.40	4696	0.588
1999	0.355	61.63	0.022	6.42	4488	0.458
2000	0.207	42.99	0.027	7.10	4314	0.300
2001	0.294	50.40	-0.013	-5.15	4263	0.373

Coefficients are computed annually from the cross-sectional regression:

$$\Delta D_{it} = a_t + b_t DEF_{it} + u_{it}.$$

The net debt issuance, ΔD_{it}, is the change in debt (Compustat item 181+10-35-79) scaled by beginning-of-year assets, $\Delta D_{it} = (D_{it} - D_{it-1}) / A_{it-1}$. The financing deficit, DEF_{it}, is the change in assets (6) minus the change in Compustat's adjusted value of balance sheet retained earnings (36) scaled by beginning-of-year assets, $DEF_{it} = ((A_{it} - A_{it-1}) - (RE_{it} - RE_{it-1})) / A_{it-1}$.

Table 4-2. Time-series of the pecking-order slope coefficient

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ERP_{t-1}	4.109	3.202					
	(5.70)	(2.99)					
$RIPO_{t-1}$			-0.478				
			(-3.80)				
$CEFD_{t-1}$				0.545			
				(1.52)			
EWR_{t-1}					-0.110		
					(-1.16)		
EWR_{t+1}					0.103		
					(1.34)		
SMB_{t-1}						-0.123	
						(-0.73)	
$SEOAR_{t-1}$							-4.917
							(-0.60)
$TAXR_t$		0.815	1.606	1.789	1.732	1.806	1.525
		(1.43)	(4.15)	(3.39)	(3.64)	(3.55)	(1.05)
$RGDP_t$		0.495	0.443	-0.294	1.213	0.188	-1.064
		(0.47)	(0.49)	(-0.30)	(0.92)	(0.17)	(-0.40)
$UPTURN_t$		-0.005	0.015	0.040	0.061	0.069	0.127
		(-0.08)	(0.26)	(0.67)	(0.98)	(1.02)	(0.94)
$INFLAT_t$		1.203	2.187	1.169	1.866	1.917	4.248
		(1.14)	(2.79)	(1.16)	(1.93)	(1.96)	(1.33)
$DEFSP_{t-1}$		-5.402	-3.424	-5.277	-0.910	-3.878	-2.469
		(-0.84)	(-0.72)	(-0.90)	(-0.16)	(-0.66)	(-0.15)
CONSTANT	0.503	0.181	-0.045	-0.191	-0.263	-0.236	-0.339
	(14.04)	(0.82)	(-0.27)	(-0.85)	(-1.29)	(-1.05)	(-0.63)
AR (1)	-0.243	-0.222	-0.297	-0.462	-0.368	-0.394	-0.228
	(-1.37)	(-1.14)	(-1.73)	(-2.90)	(-2.17)	(-2.39)	(-0.84)
Adjusted R^2	0.676	0.753	0.774	0.617	0.714	0.690	0.446
N	33	33	39	39	39	39	21

The following equation is estimated:

$$\hat{b}_t = f(\text{cost of equity proxies, control variables}).$$

The dependent variable is the estimated pecking-order slope coefficient from Table 4-1. ERP is the implied market equity risk premium at the year-end, estimated using analyst forecasts for the Dow 30 stocks from Value Line for 1968-1976 and from I/B/E/S for 1977-2001. RIPO is the annual average of initial returns of initial public offerings from Jay Ritter at http://bear.cba.ufl.edu/ritter/ipodata.htm. CEFD is the value-weighted average of the closed-end fund discount at the year-end from Malcolm Baker and Jeffrey Wurgler, who construct the series by combining several sources (Neal and Wheatley, 1962-1993; CDA/Weisenberger, 1994-1998; and the *Wall Street Journal*, 1999-2001). EWR is the equally weighted market returns from CRSP. SMB is the difference in the average return on portfolios of small stocks and portfolios of big stocks from Kenneth French. SEOAR is the annual average of market-adjusted returns from one day before to one day after the file date of seasoned equity offerings (SEOs) from Thomson Financial.

Table 4-2. Continued
The average announcement effect is calculated from 1980, the first year the file date is available for most SEOs. TAXR is the statutory corporate tax rate. RGDP is the real GDP growth rate from the Bureau of Economic Analysis, Department of Commerce. UPTURN equals one for years between a "trough" and a "peak" declared by NBER, and zero for other years. INFLAT is the inflation rate from CRSP. DEFSP is the default spread calculated as the yield difference between Moody's Baa rated and Aaa rated corporate bonds at the year-end. An autoregressive term, AR (1), is included to account for residual serial correlation. The subscripts denote years. t-statistics are reported in parentheses.

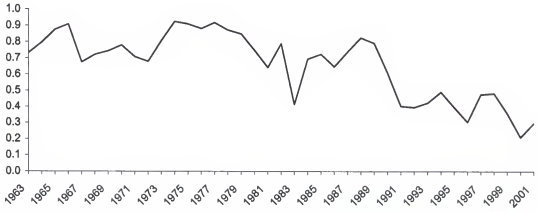

Figure 4-1. Pecking order slope coefficients. Coefficients are computed annually by estimating equation 4-1.

Figure 4-1 plots the estimated pecking-order coefficient. Comparing Figure 4-1 with Figures 3-5 and 3-6, it is not difficult to see that the pecking-order coefficient is positively correlated with lagged values of the implied equity risk premium and the closed-end fund discount, and negatively correlated with the lagged average first-day return of IPOs.

In Table 4-2, the time-series of the slope coefficient is linked to cost-of-equity proxies by estimating the following equation:

$$\hat{b}_t = f(\text{cost of equity proxies, control variables}). \qquad (4\text{-}2)$$

Our proxies for the cost of equity are highly correlated, so we do not include all of them in one regression to avoid potential multicollinearity. We also include an autoregressive term to control for residual serial correlation.

The results provide strong support for the windows-of-opportunity theory. Firms finance a large proportion of their financing deficit with net external equity when the cost of equity is low. Seven specifications are reported. The lagged implied equity risk premium is the only independent variable in specification (1). It is positively related to the pecking-order coefficient. The implied equity risk premium remains statistically significant even after we control for macroeconomic conditions. In economic terms, a one-standard-deviation increase in the implied equity risk premium is associated with 11.8 percent more of the financing deficit being funded with net debt in specification (2). The lagged average first-day return of IPOs is used as alternative proxy for the cost of equity in specification (3). A one-standard-deviation increase in the lagged average first-day return of IPOs is associated with 7.7 percent less of the financing deficit being funded with net debt.

When the closed-end fund discount is included in (4), it has the expected sign, but the relation is not statistically significant. Realized stock-market returns are included in specification (5). Firms tend to fund a smaller proportion of their financing deficit with net debt after stock-market price run-ups and before market downturns, though realized returns are not statistically significant. The statistical insignificance does not lead us to reject the importance of the cost of equity, however. Realized return is a noisy proxy for the cost of equity, because it might be difficult for arbitrageurs to eliminate low-frequency market-level misvaluations (Shleifer and Vishny (1997)). In specification

(6), the size discount reduces the proportion of the financing deficit funded with net debt, but is again not statistically significant. Specification (7) includes the average announcement effect of SEOs as an explanatory variable. Its sign is consistent with previous studies, but the relation is not statistically significant, suggesting that informational costs are of secondary importance in equity issue decisions at the aggregate level for the period of 1980-2001.

We do not expect the rate of inflation to have an impact on the choice between debt and external equity if it is neutral. However, inflation may have real implications. If inflation is positively related to the relative cost of equity versus debt, then firms are expected to issue more debt in the presence of high inflation. This is indeed what we find in specifications (3), (5), and (6). Under the static-tradeoff theory, firms should issue more debt to reduce their tax liabilities when the statutory corporate tax rate is higher. Consistent with the theory, firms fund a larger proportion of their financing deficit with net debt when the corporate tax rate is higher in specifications (3)-(6). The real GDP growth rate and the business expansion dummy are never significant at the 10 percent level, suggesting that investment opportunities do not drive the changing financing behaviors. The expected default spread is never significant, possibly because the cost of debt does not vary as much as the cost of equity.

Instead of the above two-stage approach, we also estimate for all years a firm fixed-effects regression where the dependent variable is the net debt issuance and the independent variables are the financing deficit and the interactions of the financing deficit and macro variables. We do not report the results because they are similar to what we find with the two-stage approach.

The pecking-order test implicitly assumes that real investment needs are exogenous. It could be argued that investing and financing activities are jointly determined. To remove potential endogeneity, we use the lagged financing deficit as an alternative measure for the expected financing deficit in unreported analyses. Our major results do not change.

Since firm characteristics have changed substantially over time, target leverage should have also changed over time under the static-tradeoff theory. Can the time-series patterns of financing activities be explained by time-varying target leverage? We explore the role of time-varying target leverage in the Appendix.

Scatter-Plots

The regression approach has both advantages and disadvantages. The advantages include the summarization of information in the pecking-order coefficient, the

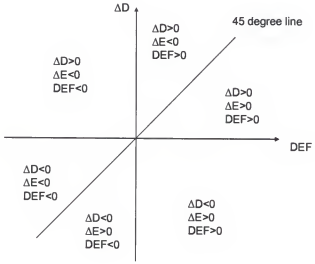

Figure 4-2. External financing activities in a coordinate. The horizontal axis is the external financing deficit, and the vertical axis is net debt issuance. ΔD is net debt issuance, ΔE is net equity issuance, and DEF is net external financing.

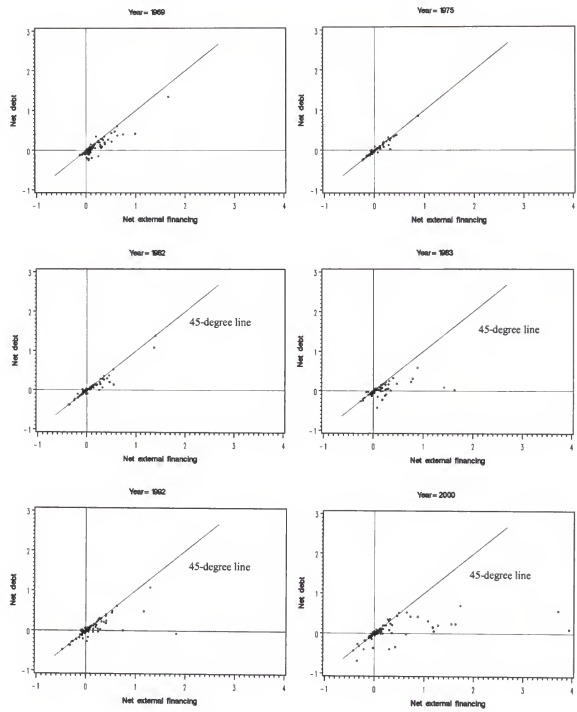

Figure 4-3. Scatter-plots of net debt versus net external financing. The horizontal axis denotes net external financing scaled by beginning-of-year assets, and the vertical axis denotes net debt scaled by beginning-of-year assets. Randomly selected 100 observations are plotted for each selected year.

convenience for analyzing a large number of firms, and the convenience for controlling for other factors in a multivariate framework. The disadvantages include the large influence of a few outliers and the oversimplification of information. The disadvantages of the regression approach manifest the importance of our summary statistics and call for additional robustness checks.

Figure 4-2 shows different scenarios of external financing activities in a coordinate of net debt financing versus net external financing. If a firm funds 100 percent of their financing deficit with net debt, then it should lie on the 45-degree line. A firm with negative net equity issuance should lie on the left hand side of the 45-degree line, while a firm with positive net equity issuance should lie on the right hand side of the 45-degree line.

To gain additional insight, we randomly select 100 firms each year and draw a scatter-plot. We limit the number of randomly selected firms to only 100 per year because a larger number makes it difficult to visually identify meaningful patterns. We report the scatter-plots for only six years in Figure 4-3 because those for other years with similar slope coefficients are qualitatively the same. A small number of firms deviate from the 45-degree line in 1975. However, around 20 percent of points are to the far right of the 45-degree line in 2000. These firms raise a lot of equity to finance their financing deficit or to retire debt. Only a few firms are to the left of the 45-degree line, suggesting that firms only infrequently borrow to repurchase shares.

Excluding Small Growth Firms

Since small growth firms are more likely to be outliers and could potentially have a large influence on the pecking-order slope coefficient, we re-estimate equation 4-1 excluding small growth firms. We annually sort all NYSE listed firms by total assets and

Table 4-3. Pecking-order tests excluding small growth firms

Year	b_t	$t(b_t)$	a_t	$t(a_t)$	N	Adj. R^2
1963	0.868	31.05	-0.012	-3.10	114	0.895
1964	0.792	55.26	-0.004	-1.99	441	0.874
1965	0.866	65.49	-0.008	-3.02	531	0.890
1966	0.895	85.64	-0.009	-3.90	680	0.915
1967	0.737	87.32	0.000	0.03	1205	0.864
1968	0.751	93.07	-0.005	-1.98	1405	0.861
1969	0.742	87.31	-0.024	-11.17	1708	0.817
1970	0.795	89.81	-0.011	-7.06	1939	0.806
1971	0.834	126.55	-0.014	-13.55	2172	0.881
1972	0.718	103.36	-0.007	-5.72	2343	0.820
1973	0.815	130.90	0.002	1.95	2453	0.875
1974	0.920	224.28	-0.002	-2.57	2605	0.951
1975	0.894	159.82	-0.010	-14.26	2664	0.906
1976	0.893	173.78	-0.007	-9.73	2626	0.920
1977	0.940	209.86	-0.006	-8.88	2520	0.946
1978	0.896	187.91	-0.003	-3.46	2462	0.935
1979	0.880	154.49	-0.002	-2.22	2506	0.905
1980	0.805	123.64	-0.010	-8.31	2579	0.856
1981	0.801	131.41	-0.012	-8.78	2477	0.875
1982	0.842	141.03	-0.010	-8.29	2604	0.884
1983	0.539	66.89	-0.013	-6.37	2580	0.634
1984	0.782	117.69	-0.006	-3.82	2650	0.839
1985	0.789	134.06	-0.009	-5.70	2717	0.869
1986	0.742	94.84	-0.009	-4.51	2709	0.769
1987	0.868	128.72	-0.014	-8.49	2680	0.861
1988	0.897	162.49	-0.005	-3.68	2742	0.906
1989	0.861	146.64	-0.006	-3.70	2668	0.890
1990	0.825	122.02	-0.005	-3.75	2596	0.852
1991	0.548	57.36	-0.011	-5.86	2540	0.564
1992	0.676	78.38	-0.015	-8.23	2627	0.701
1993	0.626	76.71	-0.014	-6.75	2780	0.679
1994	0.611	81.83	-0.007	-3.43	3017	0.689
1995	0.543	76.46	-0.001	-0.34	3194	0.647
1996	0.478	74.39	-0.006	-2.41	3517	0.611
1997	0.594	93.41	-0.009	-3.80	3826	0.695
1998	0.613	102.68	-0.001	-0.23	3950	0.727
1999	0.489	74.99	-0.001	-0.35	3694	0.604
2000	0.269	45.68	0.005	1.42	3440	0.377
2001	0.368	53.02	-0.024	-10.52	3663	0.434

Coefficients are computed annually from the cross-sectional regression:

$$\Delta D_{it} = a_t + b_t DEF_{it} + u_{it}.$$

The net debt issuance, ΔD_{it}, is the change in debt (Compustat item 181+10-35-79) scaled by beginning-of-year assets, $\Delta D_{it} = (D_{it} - D_{it-1}) / A_{it-1}$. The financing deficit, DEF_{it}, is the change in assets (6) minus the change in Compustat's adjusted value of balance sheet retained earnings (36) scaled by beginning-of-year assets, $DEF_{it} = ((A_{it}-A_{it-1})-(RE_{it}-RE_{it-1})) / A_{it-1}$.

Table 4-4. Time-series of the pecking-order slope coefficient excluding small growth firms

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ERP_{t-1}	3.524	3.342					
	(6.22)	(3.50)					
$RIPO_{t-1}$			-0.515				
			(-4.90)				
$CEFD_{t-1}$				0.236			
				(0.70)			
EWR_{t-1}					-0.067		
					(-0.79)		
EWR_{t+1}					0.119		
					(1.74)		
SMB_{t-1}						-0.118	
						(-0.77)	
$SEOAR_{t-1}$							-3.409
							(-0.43)
$TAXR_t$		-0.079	0.961	1.171	1.143	1.202	0.959
		(-0.16)	(2.92)	(2.34)	(2.49)	(2.50)	(0.69)
$RGDP_t$		1.307	0.836	0.162	1.208	0.553	-0.446
		(1.31)	(1.12)	(0.18)	(1.03)	(0.55)	(-0.17)
$UPTURN_t$		-0.039	-0.031	-0.007	0.008	0.018	0.083
		(-0.63)	(-0.67)	(-0.13)	(0.14)	(0.29)	(0.64)
$INFLAT_t$		1.053	1.834	1.133	1.306	1.535	4.530
		(1.12)	(2.79)	(1.19)	(1.46)	(1.70)	(1.49)
$DEFSP_{t-1}$		-0.036	-0.109	-1.148	2.078	-0.482	-0.624
		(-0.01)	(-0.03)	(-0.21)	(0.39)	(-0.09)	(-0.04)
CONSTANT	0.613	0.592	0.330	0.170	0.106	0.121	0.019
	(22.31)	(3.13)	(2.31)	(0.79)	(0.53)	(0.57)	(0.04)
AR (1)	-0.108	-0.099	-0.323	-0.469	-0.427	-0.425	-0.228
	(-0.60)	(-0.50)	(-1.90)	(-2.96)	(-2.58)	(-2.61)	(-0.84)
Adjusted R^2	0.626	0.681	0.759	0.606	0.641	0.601	0.435
N	33	33	39	39	39	39	21

The following equation is estimated:

$$\hat{b}_t = f(\text{cost of equity proxies, control variables}).$$

The dependent variable is the estimated pecking-order slope coefficient from Table 4-3. ERP is the implied market equity risk premium at the year-end, estimated using analyst forecasts for the Dow 30 stocks from Value Line for 1968-1976 and from I/B/E/S for 1977-2001. RIPO is the annual average of initial returns of initial public offerings from Jay Ritter at http://bear.cba.ufl.edu/ritter/ipodata.htm. CEFD is the value-weighted average of the closed-end fund discount at the year-end from Malcolm Baker and Jeffrey Wurgler, who construct the series by combining several sources (Neal and Wheatley, 1962-1993; CDA/Weisenberger, 1994-1998; and the *Wall Street Journal*, 1999-2001). EWR is the equally weighted market returns from CRSP. SMB is the difference in the average return on portfolios of small stocks and portfolios of big stocks from Kenneth French. SEOAR is the annual average of market-adjusted returns from one day before to one day after the file date of seasoned equity offerings (SEOs) from Thomson Financial.

Table 4-4. Continued
The average announcement effect is calculated from 1980, the first year the file date is available for most SEOs. TAXR is the statutory corporate tax rate. RGDP is the real GDP growth rate from the Bureau of Economic Analysis, Department of Commerce. UPTURN equals one for years between a "trough" and a "peak" declared by NBER, and zero for other years. INFLAT is the inflation rate from CRSP. DEFSP is the default spread calculated as the yield difference between Moody's Baa rated and Aaa rated corporate bonds at the year-end. An autoregressive term, AR (1), is included to account for residual serial correlation. The subscripts denote years. t-statistics are reported in parentheses.

use the quartile cutoff points to categorize firms in our sample into four size groups. We also sort all NYSE-listed firms by asset growth and use the quartile cutoff points to categorize all our sample firms into four growth groups. For each year, small growth firms are defined as those in both the smallest size group and the fastest growth group. The results from the pecking order tests excluding small growth firms are reported in Table 4-3. Table 4-4 links the pecking order slope coefficient to the cost of equity. Excluding small growth firms actually strengthens our results, possibly because small growth firms lead to noisier estimates of the pecking-order slope coefficient. In the first three specifications, the implied equity risk premium and the average first-day return of IPOs become more important, statistically and economically. Future market returns become significant at the 10 percent level in specification (5). Firms fund a larger proportion of their financing deficit with net equity before poor market returns.

Logit Model for the Choice between Debt and Equity

Since Chirinko and Singha (2000) point out that the pecking-order tests may generate misleading inferences, we try alternative tests for the windows-of-opportunity theory. Instead of estimating the pecking-order equation to examine continuous financing decisions for all firms, we focus on the subsample of firms that have issued a significant amount of debt or equity and estimate a logit regression for the discrete choice between debt and equity issues, using pre-issue firm characteristics and market conditions. We

estimate pooled logit regressions for all firm years. When we instead estimate firm fixed-effects regressions in unreported analyses, our major results are not affected.

The dependent variable equals one if the firm issues external equity, and equals zero if the firm issues debt. We follow Hovakimian et al. (2001) and Korajczyk and Levy (2003) in the use of the five percent rule to define debt and equity issues. A firm is defined as issuing debt if net debt is at least five percent of its beginning-of-year assets. Similarly, a firm is defined as issuing equity if net equity is at least five percent of its beginning-of-year assets.[9]

The explanatory variables include financial slack (the sum of cash and short-term investments scaled by assets), a dummy for whether the firm pays dividends, profitability, Q (market-to-book ratio for assets), R&D, the logarithm of net sales, the logarithm of the number of years the firm has been listed on CRSP, the leverage deficit, lagged leverage, the market-adjusted return during the previous fiscal year, and the market-adjusted return during the three following fiscal years.[10] The leverage deficit is defined as the fitted value from target leverage regression (1) in Table A-1 minus lagged leverage. In addition to firm characteristics, we also include our proxies for the relative cost of equity and other proxies for macro conditions.

The results are reported in Table 4-5. In all specifications, small, high Q and R&D firms are more likely to issue equity, consistent with most of the literature. Firms with

[9] Firm years when both debt and equity are issued are excluded. The results are stronger when they are included and treated as equity issues. For characteristics of firms issuing both debt and equity, see Hovakimian et al. (2004).

[10] Excluding the market-adjusted return during the three following fiscal years does not change our major results.

Table 4-5. Logit regressions

	(1)		(2)		(3)		(4)		(5)		(6)	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
$CASH_{it-1}$	0.079	4.5	0.080	4.7	0.088	5.2	0.085	5.0	0.086	5.0	0.079	3.5
$DIVIDEND_{it-1}$	0.023	3.8	0.019	3.2	0.021	3.6	0.019	3.1	0.018	3.1	0.022	2.6
$OIBD_{it-1}$	0.048	1.5	0.042	1.3	0.089	2.8	0.064	2.0	0.063	1.9	0.027	0.6
Q_{it-1}	0.038	18.4	0.036	18.1	0.036	18.2	0.037	18.7	0.038	19.3	0.043	15.5
$R\&D_{it-1}$	0.543	13.8	0.532	13.8	0.563	14.5	0.543	14.0	0.544	14.0	0.681	13.5
$SALE_{it-1}$	-0.033	-18.4	-0.032	-18.6	-0.033	-18.5	-0.033	-18.5	-0.032	-18.2	-0.042	-17.4
AGE_{it}	0.000	2.3	0.000	2.0	0.000	1.2	0.000	2.0	0.000	2.0	0.000	1.5
$LDEF_{it}$	0.411	8.5	0.380	8.1	0.472	9.8	0.432	9.0	0.443	9.2	0.533	8.4
L_{it-1}	0.592	12.2	0.556	11.8	0.645	13.4	0.606	12.6	0.618	12.8	0.736	11.6
$ERET_{it-1}$	0.034	11.5	0.032	11.1	0.032	11.2	0.030	10.3	0.030	10.3	0.044	10.7
$ERET_{it+1, t+3}$	-0.012	-7.9	-0.011	-7.5	-0.010	-6.6	-0.012	-7.8	-0.012	-7.9	-0.009	-4.5
ERP_{t-1}	-0.772	-7.5										
$RIPO_{t-1}$			0.250	15.3								
$CEFD_{t-1}$					-0.462	-13.4						
EWR_{t-1}							0.092	8.8				
EWR_{t+1}							-0.085	-8.4				
SMB_{t-1}									0.108	5.6		
$SEOAR_{t-1}$											3.502	5.4
$TAXR_t$	0.092	1.6	-0.091	-1.8	-0.136	-2.7	-0.061	-1.2	-0.113	-2.2	-0.322	-2.9
$RGDP_t$	-0.635	-5.0	-0.535	-4.4	-0.251	-2.1	-1.270	-8.9	-0.563	-4.5	0.402	1.8
$UPTURN_t$	0.038	4.3	0.036	4.1	0.037	4.3	0.008	0.9	0.005	0.6	-0.010	-0.5
$INFLAT_t$	-0.956	-8.2	-1.464	-14.5	-0.509	-4.2	-1.370	-13.3	-1.461	-13.9	-1.506	-4.3
$DEFSP_{t-1}$	5.915	9.7	4.883	9.1	4.860	9.0	3.417	6.2	4.727	8.6	7.461	5.7
CONSTANT	-0.510	-13.1	-0.439	-11.8	-0.445	-11.8	-0.381	-10.0	-0.401	-10.3	-0.371	-5.7
N	34,013		35,022		35,022		35,022		35,022		22,760	
Pseudo R^2	0.126		0.129		0.128		0.127		0.124		0.114	

Table 4-5 Continued

Logit regressions are estimated and marginal effects are reported. The dependent variable equals one if the firm issues equity, and zero if the firm issues debt. Debt issuers are the base category. ΔD is the change in debt and preferred stock (Compustat item 181+10-35-79). ΔE is the change in equity and convertible debt (6-181-10+35+79) minus the change in retained earnings (36). A firm is defined as issuing debt if $\Delta D/A_{t-1} \geq 0.05$. Similarly, a firm is defined as issuing equity if $\Delta E/A_{t-1} \geq 0.05$. CASH is the sum of cash and short-term investments (1) scaled by assets. DIVIDEND equals one if a firm pays dividend. OIBD is operating income before depreciation (13) scaled by assets. Q is the market-to-book ratio of assets. R&D is the intensity of research and development (46) scaled by assets. SALE is the logarithm of net sales (12). AGE is the logarithm of the number of years the firm has been listed on CRSP. $LDEF_{it}$ is the leverage deficit, $LDEF_{it} = TL_{it} - L_{it-1}$, where TL_{it} is the fitted value from target leverage regression (1) in Table A-1, and L_{it-1} is lagged leverage. $ERET_{it-1}$ is the market-adjusted returns during the previous fiscal year, measured as the difference between the firm raw return and the value-weighted market return in the preceding fiscal year. $ERET_{it+1, t+3}$ is the market-adjusted returns during the three fiscal years after events, measured as the difference between the firm raw return and the value-weighted market return in the following three fiscal years. If a firm is delisted, its post-event three-year raw return is calculated by compounding the CRSP value-weighted market return for remaining months. The calculation of post-event returns will not be affected if a firm changes its fiscal year-end month. ERP is the implied market equity risk premium at the year-end, estimated using analyst forecasts for the Dow 30 stocks from Value Line for 1968-1976 and from I/B/E/S for 1977-2001. RIPO is the annual average of initial returns of initial public offerings from Jay Ritter at http://bear.cba.ufl.edu/ritter/ipodata.htm. CEFD is the value-weighted average of the closed-end fund discount at the year-end from Malcolm Baker and Jeffrey Wurgler, who construct the series by combining several sources (Neal and Wheatley, 1962-1993; CDA/Weisenberger, 1994-1998; and the *Wall Street Journal*, 1999-2001). EWR is the equally weighted market returns from CRSP. SMB is the difference in the average return on portfolios of small stocks and portfolios of big stocks from Kenneth French. SEOAR is the annual average of market-adjusted returns from one day before to one day after the file date of seasoned equity offerings (SEOs) from Thomson Financial. The average announcement effect is calculated from 1980, the first year the file date is available for most SEOs. TAXR is the statutory corporate tax rate. RGDP is the real GDP growth rate from the Bureau of Economic Analysis, Department of Commerce. UPTURN equals one for years between a "trough" and a "peak" declared by NBER, and zero for other years. INFLAT is the inflation rate from CRSP. DEFSP is the default spread calculated as the yield difference between Moody's Baa rated and Aaa rated corporate bonds at the year-end. The subscripts denote firms or years.

more cash at hand and non-dividend payers are more likely to issue equity rather than debt.

The static-tradeoff theory predicts firms with a large leverage deficit to issue debt to adjust toward their target leverage. Surprisingly, we find that firms with a large leverage deficit are more likely to issue equity. When we use the industry median leverage as target leverage instead to define the leverage deficit in unreported analyses, however, firms with a large leverage deficit are more likely to issue debt. This is partially consistent with Hovakimian et al. (2001), who find that the median industry leverage is more important than the estimated target leverage in securities issue decisions.

Consistent with Loughran and Ritter (1995), who report a 72 percent average return for equity issuers in the year prior to a follow-on offering, firms are more likely to issue equity following stock price run-ups. Confirming the long-run performance studies of SEOs by Loughran and Ritter (1995) and Spiess and Affleck-Graves (1995), firms that subsequently underperform are more likely to issue equity instead of debt. In contrast, Jung, Kim, and Stulz (1996) do not find any statistical significance of the post-issue return for a small sample of U.S. firms from 1977 to 1984. The difference arises partly because the sample employed in our study is larger than their sample. Since the post-issue return is a noisy measure of misvaluation, only a large sample is able to detect any statistically significant relation. The important role of Tobin's Q, the pre-issue market-adjusted firm return, and the post-issue firm return in the choice between debt and equity issues is supportive of the windows-of-opportunity theory at the firm level.

Unlike most of the literature, we are also interested in examining the role of the relative cost of equity at the market level. All our cost-of-equity proxies are statistically

significant and have the expected sign. Since we have at most 39 data points for these variables, it is amazing that their statistical significance is comparable to that of firm specific characteristics. In economic terms, an increase of one standard deviation in the implied equity risk premium and the closed-end fund discount reduces the average propensity to issue equity by 2.9 percent in specification (1), and by 3.7 percent in (3), respectively, while an increase of one standard deviation in the lagged average return of IPOs increases the propensity by 4.0 percent in (2).

Although realized returns are insignificantly related to the pecking order slope coefficient, they are significantly related to the propensity to issue equity at the one percent level. In specification (4), firms are more likely to issue equity following stock market run-ups. The average propensity to issue equity increases by 2.4 percent per standard deviation increase in the pre-issue market return. The importance of past market returns is consistent with the windows-of-opportunity theory. In saying this, we do realize that the lagged stock-market return could reflect growth opportunities. However, the insignificant role of other proxies for growth opportunities leads us to believe that the stock-market run-up at least partially reflects a lower cost of equity. Furthermore, the average propensity to issue equity decreases by 2.2 percent per standard deviation increase in the post-issue market return. Neither the static-tradeoff theory nor the pecking-order theory can explain this. The size discount is positively related to the propensity to issue equity in specification (6). Confirming Bayless and Chaplinsky (1996), the average market-adjusted announcement effect of SEOs is positively related to the propensity to issue equity. However, in terms of economic significance, the

propensity to issue equity increases by only 1.8 percent per standard deviation increase in the average announcement effect.

Inflation and the default spread also play an important role. In every specification, there is a negative relation between inflation and the propensity to issue equity, and a positive relation between the lagged default spread and the propensity to issue equity. For example, the propensity to issue equity decreases by 3.0 percent per standard increase in the rate of inflation, and increases by 3.0 percent per standard deviation increase in the lagged default spread in specification (1). The important role of inflation suggests that inflation is not neutral and is probably linked to the relative cost of external equity versus debt. Surprisingly, although the statutory corporate tax rate is positively related to the proportion of the financing deficit being funded with net debt, it has not material impact on the discrete choice between debt and equity issues.

Overall, the logit regression results are very supportive of the windows-of-opportunity theory. The choice between debt and equity depends largely on the relative cost of equity versus debt, not only at the market level, but also at the firm level. It is difficult to explain all these results simultaneously unless the relative cost of equity varies across time.

Multinomial Logit Model for the Joint Decision

A firm may jointly decide whether to issue securities and which security to issue. For example, it is possible that a firm chooses between issuing equity and not issuing any securities, without even thinking of issuing debt. Therefore, we also estimate a multinomial logit model for the joint decision. The dependent variable equals two if the firm issues equity, one if the firm issues debt, and zero if the firm issues neither equity nor debt. We use non-issuers as the base category.

Table 4-6. Multinomial logit regressions

	(1)				(2)				(3)			
	Debt		Equity		Debt		Equity		Debt		Equity	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
$CASH_{it-1}$	-0.290	-17.6	-0.045	-4.3	-0.290	-17.7	-0.037	-3.6	-0.292	-17.8	-0.034	-3.3
$DIVIDEND_{it-1}$	-0.028	-5.5	-0.014	-4.0	-0.025	-4.9	-0.018	-5.1	-0.026	-5.1	-0.017	-4.9
$OIBD_{it-1}$	-0.096	-3.1	0.028	1.5	-0.079	-2.6	0.027	1.4	-0.101	-3.3	0.056	3.0
Q_{it-1}	0.024	10.2	0.050	38.7	0.024	10.6	0.049	38.9	0.024	10.6	0.049	39.1
$R\&D_{it-1}$	-0.210	-5.1	0.370	16.5	-0.196	-4.7	0.372	16.7	-0.211	-5.1	0.394	17.6
$SALE_{it-1}$	0.025	15.6	-0.015	-14.0	0.024	15.5	-0.014	-13.5	0.024	15.5	-0.014	-13.2
AGE_{it}	-0.001	-9.9	-0.002	-14.6	-0.001	-9.8	-0.002	-15.1	-0.001	-9.5	-0.002	-15.6
$LDEF_{it}$	-0.378	-7.8	0.268	9.7	-0.334	-7.0	0.269	9.9	-0.377	-7.9	0.331	12.1
L_{it-1}	-0.439	-9.0	0.343	12.5	-0.392	-8.2	0.344	12.7	-0.435	-9.0	0.403	14.7
$ERET_{it-1}$	0.034	10.7	0.062	32.4	0.034	10.9	0.060	31.9	0.033	10.6	0.060	32.3
$ERET_{it+1, t+3}$	0.001	0.6	-0.019	-18.0	0.000	0.1	-0.018	-17.4	0.000	-0.3	-0.017	-16.8
ERP_{t-1}	-0.024	-0.3	-1.130	-18.1								
$RIPO_{t-1}$					-0.099	-6.9	0.210	20.9				
$CEFD_{t-1}$									0.156	5.7	-0.267	-12.6
$TAXR_t$	0.014	0.3	0.201	5.5	0.021	0.5	-0.036	-1.2	0.031	0.7	-0.062	-2.0
$RGDP_t$	1.280	13.1	-0.263	-3.3	1.321	13.7	-0.058	-0.8	1.180	12.3	0.170	2.2
$UPTURN_t$	-0.021	-3.5	0.033	6.4	-0.026	-4.4	0.022	4.2	-0.028	-4.7	0.022	4.2
$INFLAT_t$	1.550	17.8	0.033	0.5	1.613	21.1	-0.626	-10.1	1.269	14.3	-0.017	-0.2
$DEFSP_{t-1}$	-6.147	-12.3	2.176	5.7	-6.392	-14.3	0.471	1.4	-6.403	-14.3	0.381	1.1
CONSTANT	0.089	2.5	-0.379	-16.8	0.078	2.2	-0.294	-13.6	0.090	2.6	-0.297	-13.6
N	83,067				85,306				85,306			
Pseudo R^2	0.077				0.076				0.074			

Table 4-6. Continued

	(4)				(5)				(6)			
	Debt		Equity		Debt		Equity		Debt		Equity	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
$CASH_{it-1}$	-0.291	-17.8	-0.033	-3.2	-0.290	-17.7	-0.035	-3.4	-0.270	-15.3	-0.055	-4.3
$DIVIDEND_{it-1}$	-0.025	-4.9	-0.018	-5.0	-0.025	-4.8	-0.018	-5.1	-0.040	-6.7	-0.028	-5.8
$OIBD_{it-1}$	-0.087	-2.8	0.047	2.5	-0.088	-2.8	0.045	2.4	-0.107	-3.1	-0.035	-1.5
Q_{it-1}	0.023	10.4	0.050	39.4	0.023	10.0	0.051	40.1	0.022	8.9	0.060	35.4
$R\&D_{it-1}$	-0.202	-4.9	0.384	17.1	-0.202	-4.9	0.383	17.0	-0.343	-8.0	0.375	13.8
$SALE_{it-1}$	0.024	15.4	-0.014	-13.3	0.024	15.4	-0.014	-13.2	0.023	13.0	-0.014	-10.3
AGE_{it}	-0.001	-9.9	-0.002	-15.0	-0.001	-9.8	-0.002	-15.0	-0.001	-5.8	-0.002	-14.5
$LDEF_{it}$	-0.356	-7.4	0.316	11.5	-0.362	-7.6	0.319	11.6	-0.389	-7.5	0.310	9.2
L_{it-1}	-0.413	-8.6	0.389	14.2	-0.419	-8.7	0.392	14.3	-0.447	-8.5	0.382	11.3
$ERET_{it-1}$	0.035	11.1	0.059	31.4	0.035	11.1	0.060	31.4	0.026	7.3	0.071	28.1
$ERET_{it+1, t+3}$	0.000	0.4	-0.018	-17.8	0.001	0.5	-0.019	-18.1	0.000	0.2	-0.017	-12.7
EWR_{t-1}	-0.052	-6.2	0.048	7.4								
EWR_{t+1}	0.028	3.5	-0.058	-9.3								
SMB_{t-1}					-0.067	-4.3	0.040	3.4				
$SEOAR_{t-1}$									-1.892	-4.4	1.431	3.9
$TAXR_t$	-0.009	-0.2	-0.012	-0.4	0.030	0.7	-0.037	-1.2	0.026	0.4	0.009	0.1
$RGDP_t$	1.704	14.7	-0.438	-4.9	1.384	13.8	0.001	0.0	0.847	5.5	0.604	4.6
$UPTURN_t$	-0.015	-2.6	0.003	0.6	-0.010	-1.6	0.006	1.1	0.002	0.2	-0.022	-2.1
$INFLAT_t$	1.614	20.6	-0.501	-7.9	1.648	20.8	-0.540	-8.3	1.105	4.6	-1.028	-5.0
$DEFSP_{t-1}$	-5.501	-11.9	-0.595	-1.7	-6.148	-13.8	0.217	0.6	-3.404	-3.8	1.636	2.1
CONSTANT	0.059	1.7	-0.262	-11.8	0.056	1.6	-0.280	-12.4	0.057	1.2	-0.265	-7.3
N	85,306				85,306				57,506			
Pseudo R^2	0.074				0.074				0.074			

Table 4-6. Continued
Multinomial logit regressions are estimated and marginal effects are reported. The dependent variable equals two if the firm issues equity, one if the firm issues debt, and zero if the firm issues neither debt nor equity. Non-issuers are the base category. ΔD is the change in debt and preferred stock (Compustat item 181+10-35-79). ΔE is the change in equity and convertible debt (6-181-10+35+79) minus the change in retained earnings (36). A firm is defined as issuing debt if $\Delta D/A_{t-1} \geq 0.05$. Similarly, a firm is defined as issuing equity if $\Delta E/A_{t-1} \geq 0.05$. CASH is the sum of cash and short-term investments (1) scaled by assets. DIVIDEND equals one if a firm pays dividend. OIBD is operating income before depreciation (13) scaled by assets. Q is the market-to-book ratio of assets. R&D is the intensity of research and development (46) scaled by assets. SALE is the logarithm of net sales (12). AGE is the logarithm of the number of years the firm has been listed on CRSP. $LDEF_{it}$ is the leverage deficit, $LDEF_{it} = TL_{it} - L_{it-1}$, where TL_{it} is the fitted value from target leverage regression (1) in Table A-1, and L_{it-1} is lagged leverage. $ERET_{it-1}$ is the market-adjusted returns during the previous fiscal year, measured as the difference between the firm raw return and the value-weighted market return in the preceding fiscal year. $ERET_{it+1, t+3}$ is the market-adjusted returns during the three fiscal years after events, measured as the difference between the firm raw return and the value-weighted market return in the following three fiscal years. If a firm is delisted, its post-event three-year raw return is calculated by compounding the CRSP value-weighted market return for remaining months. The calculation of post-event returns will not be affected if a firm changes its fiscal year-end month. ERP is the implied market equity risk premium at the year-end, estimated using analyst forecasts for the Dow 30 stocks from Value Line for 1968-1976 and from I/B/E/S for 1977-2001. RIPO is the annual average of initial returns of initial public offerings from Jay Ritter at http://bear.cba.ufl.edu/ritter/ipodata.htm. CEFD is the value-weighted average of the closed-end fund discount at the year-end from Malcolm Baker and Jeffrey Wurgler, who construct the series by combining several sources (Neal and Wheatley, 1962-1993; CDA/Weisenberger, 1994-1998; and the *Wall Street Journal*, 1999-2001). EWR is the equally weighted market returns from CRSP. SMB is the difference in the average return on portfolios of small stocks and portfolios of big stocks from Kenneth French. SEOAR is the annual average of market-adjusted returns from one day before to one day after the file date of seasoned equity offerings (SEOs) from Thomson Financial. The average announcement effect is calculated from 1980, the first year the file date is available for most SEOs. TAXR is the statutory corporate tax rate. RGDP is the real GDP growth rate from the Bureau of Economic Analysis, Department of Commerce. UPTURN equals one for years between a "trough" and a "peak" declared by NBER, and zero for other years. INFLAT is the inflation rate from CRSP. DEFSP is the default spread calculated as the yield difference between Moody's Baa rated and Aaa rated corporate bonds at the year-end. The subscripts denote firms or years.

Table 4-6 reports the results, which are generally in line with the logit regression results. However, it is interesting to note that some variables are more important for the decision to issue equity, while others are more important for the decision to issue debt. Therefore, our motivation for estimating the multinomial logit model is justified. Future studies of financing decisions should consider the joint determination of whether to issue any securities and which security to issue.

Consistent with the pecking-order prediction, firms with a lot of cash at hand avoid issuing securities, especially debt, and dividend payers also avoid issuing securities. These firms have less need for external funds. The coefficients on Tobin's Q are all significant and positive for the decision to issue securities, especially equity. Profitable firms are less likely to issue debt, contrary to the static-tradeoff prediction that these firms should issue debt to reduce agency costs and tax liabilities. Small and high R&D firms are more likely to issue equity, but are less likely to issue debt. The coefficients on AGE are all significant and negative, suggesting that young firms rely more on external funds.

Firms with a large leverage deficit are less likely to issue debt and more likely to issue equity. This is not predicted by the tradeoff theory. Firms that have recently experienced a stock price run-up are more likely to issue securities, especially equity. Unlike most of the literature, our study has included subsequent market-adjusted firm returns in our regressions. Firms that subsequently underperform are more likely to issue equity. In contrast, there is no statistically significant relation between debt issuance and subsequent market-adjusted returns.

The multinomial logit results provide even stronger support for the windows-of-opportunity theory. In all specifications, Tobin's Q and pre-issue market-adjusted returns have much larger t-statistics than other variables in the decision to issue equity.[11] The subsequent market-adjusted return also has a large t-statistic in the decision to issue equity. The primary importance of price levels and changes in the decision to issue equity can be explained with the windows-of-opportunity theory based on the relative cost of equity.

Our proxies for the relative cost of equity at the market level are also important, statistically and economically, even after controlling for firm characteristics. In specification (1), an increase of one standard deviation in the expected equity market risk premium reduces the propensity to issue equity by 4.2 percent. And it is interesting to note that the expected equity risk premium has no material impact on the decision to issue debt.

The lagged first-day return of IPOs tends to increase the propensity to issue equity and decrease the propensity to issue debt. In economic terms, the propensity to issue equity increases by 3.4 percent per standard increase in the lagged first-day return of IPOs, while the propensity to issue debt decreases by 1.6 percent. The closed-end fund discount is positively related to the propensity to issue debt, but is negatively related to the propensity to issue equity. Firms are more likely to issue equity and less likely to issue debt after a stock market run-up and before a stock market downturn. In specification (6), the size discount also has the expected effect on securities issue

[11] Casual talks with investment bankers suggest that when they advise their clients on the choice between debt and external equity financing, the most important factor they consider is whether their clients' stock prices are at a 52-week high.

decisions. Finally, firms also tend to issue equity when the announcement effect of SEOs is less negative, and issue debt otherwise. All of the above results are consistent with the windows-of-opportunity theory based on the time-varying cost of capital.

Surprisingly, the statutory tax rate has no material effect. The real GDP growth rate is positively related to the likelihood of debt issuance, but is not reliably related to the likelihood of equity issuance. The business expansion dummy has no reliable relation with securities issue decisions. Inflation is positively related to the propensity to issue debt, but is not reliably related to the decision to issue equity. One possible explanation is that inflation actually reduces the real cost of debt. The expected default spread is negatively related to the propensity to issue debt. In contrast, it is not always significantly related to the propensity to issue equity.

In summary, the logit and multinomial logit results provide substantial support for the windows-of-opportunity theory. In unreported analyses, we also estimate the propensity to issue equity each year using only pre-issue firm characteristics, and then link market conditions to the annual average of the predicted propensity to issue equity. We find that our cost-of-equity proxies greatly help explain the average predicted propensity to issue equity. Therefore, we believe that our findings are robust to various methodologies.

CHAPTER 5
CONCLUSIONS

The time-series variation of financing decisions of U.S. firms has been explored only recently. Neither the static-tradeoff theory nor the pecking-order theory provides an adequate explanation for these variations. Only the windows-of-opportunity theory based on time-variation in the relative cost of equity can satisfactorily explain the year-to-year fluctuations in the use of debt and external equity.

Linking the pecking-order slope coefficient to the relative cost of equity, we find that firms fund a larger proportion of their financing deficit with net external equity when the expected equity market risk premium is lower and the lagged average first-day return of IPOs is higher, even after controlling for macroeconomic conditions.

Our results are robust to various additional checks. We gain additional insight into our regression results through our summary statistics and scatter-plots of randomly selected firms. Small growth firms do not drive our results. While small growth firms always rely on debt financing, they only resort to external equity when the cost of equity is low. Furthermore, excluding small growth firms from our sample does not change our major results. Controlling for partial adjustment toward target leverage or changing firm characteristics does not change our major results either.

We also estimate a logit model for the discrete choice between debt and equity issues and a multinomial logit model for the joint determination of whether to issue securities and which security to issue. We find that firms are more likely to issue equity instead of debt when the expected equity risk premium is lower, the average first-day

return of IPOs is higher, the closed-end fund discount is smaller, the size discount is larger, past market returns are higher, future market returns are lower, the average announcement effect of seasoned equity offerings is less negative, and the expected default spread is higher, after controlling for firm characteristics and other macro conditions in a multivariate framework. At the firm level, firms that subsequently underperform are more likely to issue equity. In the multinomial logit model, we also find that Tobin's Q and the past market-adjusted firm return have much larger t-statistics than other variables in explaining the decision to issue equity.

Overall, our results favor the windows-of-opportunity theory over alternative theories as an explanation for observed time-series patterns of external financing decisions of U.S. publicly traded firms. Because of the importance of the time-varying cost of equity in observed external financing decisions, future theoretical work on capital structure should take it into consideration. We also feel that it would be fruitful to explore the importance of the implied equity risk premium for corporate financing decisions in other countries.

APPENDIX
TIME-VARYING TARGET LEVERAGE

Determinants of Target Leverage

In the body of our paper we find that the windows-of-opportunity theory based on the relative cost of equity greatly help explain the time-series patterns of financing activities. Can the static-tradeoff theory provide a satisfactory explanation? Target leverage changes as firm characteristics change. To determine whether the time-series patterns of financing activities can be explained by time-varying target leverage, we first estimate the target leverage regression:

$$L_{it} = f(\text{firm characteristics}_{i,t-1}). \quad \text{(A-1)}$$

The dependent variable, L_{it}, is either book leverage or market leverage as defined earlier for firm i at the end of the fiscal year ending in calendar year t. Firm characteristics include the lagged values of the market-to-book ratio for assets (or Tobin's Q), R&D, capital expenditure, the logarithm of net sales, operating income before depreciation, a dividend paying dummy, tangibility, intangibility, inventory, net operating loss carry forwards, and investment tax credits. These variables have been documented to be important determinants of capital structure.

Because the static-tradeoff theory is silent on whether firms should target book leverage or market leverage, we try both. We also try various empirical methodologies to deal with potential econometric problems (Fama and French (2002b)). The results are reported in Table A-1. The first four specifications estimate the fixed-effects model with time dummies. This methodology requires the same coefficient over time for each

Table A-1. Target leverage regressions

	(1)		(2)		(3)		(4)		(5)		(6)	
	Firm fixed-effects with time dummies		Firm fixed-effects with time dummies		Industry fixed-effects with time dummies		Industry fixed-effects with time dummies		Fama-MacBeth procedure		Fama-MacBeth procedure	
	Book leverage		Market leverage		Book leverage		Market leverage		Book leverage		Market leverage	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
Q	0.006	9.29	-0.026	-56.08	-0.006	-8.83	-0.051	-108.56	0.003	1.01	-0.068	-13.36
R&D	-0.148	-6.63	-0.342	-22.16	-0.881	-54.97	-0.842	-74.09	-0.928	-17.02	-1.011	-21.33
CAPEX	-0.055	-4.50	-0.110	-13.04	0.023	1.65	-0.160	-16.39	0.098	2.25	-0.066	-1.95
SALE	0.020	18.08	0.034	44.02	0.038	72.08	0.027	72.11	0.035	16.48	0.025	21.59
OIBD	-0.487	-66.73	-0.415	-81.86	-0.632	-90.10	-0.548	-109.87	-0.670	-23.62	-0.650	-18.95
DIVIDEND	-0.057	-25.28	-0.047	-30.41	-0.108	-54.55	-0.093	-66.02	-0.109	-17.60	-0.088	-14.89
TANG	0.166	20.83	0.189	34.25	0.189	33.25	0.192	47.59	0.112	5.17	0.143	9.23
INTANG	0.187	16.96	0.150	19.62	0.334	36.73	0.165	25.50	0.331	20.89	0.185	8.33
INVENT	0.119	11.37	0.148	20.34	0.193	29.31	0.215	45.97	0.112	9.95	0.167	14.74
NOLCF	0.120	48.41	0.017	9.77	0.136	53.12	0.019	10.24	0.233	10.77	0.001	0.07
ITAXC	-4.424	-7.82	-2.235	-5.72	-6.015	-13.06	-3.925	-12.00	-2.774	-4.30	-4.948	-4.34
CONSTANT	0.438	58.51	0.274	52.93	0.347	63.54	0.371	95.68	0.409	25.00	0.473	21.85
R^2	0.131		0.348		0.199		0.405		0.251		0.422	
N	108,174		107,658		108,174		107,658		39		39	

The following equation is estimated:

$$L_{it} = f(\text{firm characteristics}_{it-1}).$$

The dependent variable, L, is book leverage, defined as the book value of debt (Compustat item 181+10-35-79) divided by the book value of total assets, or market leverage, defined as the book value of debt divided by the market value of total assets. The market value of assets is defined as the book value of total assets minus the book value of debt plus the market value of equity (181+10-35+25*199). All independent variables are lagged by one year. Q is the market-to-book ratio of assets. R&D is the research and development expense (46). CAPEX is the capital expenditure (128). SALE is the log of net sales (12). OIBD is the operating income before depreciation (13). DIVIDEND equals one if a firm pays dividends, and equals zero otherwise. TANG is the net PPE (8). INTANG is the intangibles (33). INVENT is the inventory (3). NOLCF is the net operating loss carry forward (52), and ITAXC is the investment tax credit (208). R&D, CAPEX, OIBD, TANG, INTANG, INVENT, NOLCF, and ITAXC are scaled by assets. We use industry classifications from Kenneth French to classify all firms into 17 industries, two of which are utilities and financials that are excluded from our sample. Coefficients for time dummies are not reported for convenience.

Table A-2. Pecking-order tests with partial adjustment

Year	b_t	$t(b_t)$	c_t	$t(c_t)$	a_t	$t(a_t)$	N	Adj. R^2
1963	0.737	19.65	0.011	0.44	-0.008	-1.42	123	0.765
1964	0.798	49.49	0.036	2.53	-0.004	-1.60	366	0.870
1965	0.826	51.33	0.034	2.20	-0.005	-1.62	438	0.860
1966	0.916	84.99	0.030	2.11	-0.012	-4.14	559	0.929
1967	0.645	52.95	-0.022	-1.10	0.008	1.80	965	0.751
1968	0.725	74.56	0.110	5.96	-0.003	-0.90	1119	0.834
1969	0.747	86.74	0.087	6.20	-0.023	-7.85	1435	0.840
1970	0.787	96.30	0.105	11.17	-0.007	-3.79	2112	0.815
1971	0.705	91.39	0.039	4.27	-0.006	-3.97	2444	0.775
1972	0.672	91.33	0.021	2.15	-0.003	-1.50	2694	0.756
1973	0.811	137.83	0.025	3.27	0.004	2.64	2921	0.867
1974	0.922	271.47	-0.010	-2.31	-0.002	-1.97	2925	0.962
1975	0.909	196.13	0.013	3.00	-0.008	-11.08	2987	0.929
1976	0.881	183.53	0.024	5.09	-0.005	-5.84	2940	0.920
1977	0.914	200.41	0.018	3.73	-0.005	-5.52	2874	0.933
1978	0.865	172.77	0.027	4.59	-0.001	-0.56	2775	0.915
1979	0.850	136.72	0.020	2.55	-0.001	-0.41	2796	0.870
1980	0.754	115.39	0.011	1.29	-0.008	-4.67	2851	0.824
1981	0.638	78.56	0.022	1.94	-0.005	-2.10	2783	0.690
1982	0.783	120.61	0.019	2.34	-0.010	-5.72	2990	0.831
1983	0.404	53.25	0.051	3.85	0.000	0.06	2977	0.495
1984	0.689	104.54	0.027	3.35	0.000	0.14	3058	0.781
1985	0.718	110.74	0.005	0.56	-0.006	-2.87	3120	0.798
1986	0.643	82.28	0.004	0.37	-0.005	-1.85	2997	0.693
1987	0.733	102.28	0.024	2.58	-0.010	-4.02	3008	0.778
1988	0.827	136.67	0.003	0.43	-0.005	-2.45	3095	0.858
1989	0.784	126.47	-0.018	2.33	-0.006	-2.99	3026	0.841
1990	0.613	82.16	0.012	1.48	0.001	0.56	2969	0.696
1991	0.406	47.61	0.013	1.35	-0.005	-1.95	2971	0.442
1992	0.384	47.12	0.017	1.83	-0.003	-1.25	3071	0.430
1993	0.435	56.91	0.024	2.71	-0.002	-0.71	3301	0.502
1994	0.498	72.38	0.015	1.74	0.005	1.67	3655	0.593
1995	0.405	63.07	-0.028	-2.60	0.019	6.15	3869	0.509
1996	0.314	51.64	-0.038	-3.12	0.016	4.64	4119	0.395
1997	0.478	83.11	-0.035	-3.37	0.008	2.43	4455	0.608
1998	0.495	83.61	-0.050	-4.96	0.023	6.99	4582	0.604
1999	0.359	60.81	-0.053	-4.56	0.026	7.32	4392	0.457
2000	0.207	40.75	-0.031	-2.54	0.031	7.90	4238	0.288
2001	0.304	50.95	-0.030	-3.87	-0.010	-3.41	4174	0.384

Coefficients are computed annually from the cross-sectional regression:

$$\Delta D_{it} = a_t + b_t DEF_{it} + c_t (TL_{it} - L_{it-1}) + u_{it}.$$

The net debt issuance, ΔD_{it}, is the change in debt (Compustat item 181+10-35-79) scaled by beginning-of-year assets, $\Delta D_{it} = (D_{it} - D_{it-1}) / A_{it-1}$. The financing deficit, DEF_{it}, is the change in assets (6) minus the change in Compustat's adjusted value of balance sheet retained earnings (36) scaled by beginning-of-year assets, $DEF_{it} = ((A_{it}-A_{it-1})-(RE_{it}-RE_{it-1}))$ $/A_{it-1}$. TL_{it} are the fitted values from target leverage regression (1) in Table A-1.

Table A-3. Time-series of the pecking-order slope coefficient with partial adjustment

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ERP_{t-1}	4.058	3.210					
	(5.63)	(3.00)					
$RIPO_{t-1}$			-0.478				
			(-3.83)				
$CEFD_{t-1}$				0.491			
				(1.36)			
EWR_{t-1}					-0.103		
					(-1.08)		
EWR_{t+1}					0.113		
					(1.46)		
SMB_{t-1}						-0.114	
						(-0.67)	
$SEOAR_{t-1}$							-5.316
							(-0.65)
$TAXR_t$		0.800	1.563	1.762	1.695	1.769	1.531
		(1.41)	(4.18)	(3.41)	(3.63)	(3.57)	(1.05)
$RGDP_t$		0.399	0.449	-0.269	1.188	0.201	-1.130
		(0.38)	(0.49)	(-0.27)	(0.90)	(0.18)	(-0.42)
$UPTURN_t$		-0.007	0.012	0.040	0.059	0.066	0.122
		(-0.11)	(0.21)	(0.65)	(0.94)	(0.96)	(0.91)
$INFLAT_t$		1.171	2.280	1.307	1.919	2.022	4.216
		(1.11)	(2.95)	(1.29)	(2.00)	(2.07)	(1.32)
$DEFSP_{t-1}$		-6.159	-3.259	-5.090	-0.844	-3.688	-3.295
		(-0.95)	(-0.70)	(-0.87)	(-0.15)	(-0.63)	(-0.20)
CONSTANT	0.507	0.203	-0.030	-0.182	-0.249	-0.224	-0.329
	(14.16)	(0.92)	(-0.18)	(-0.82)	(-1.24)	(-1.03)	(-0.62)
AR (1)	-0.244	-0.227	-0.259	-0.435	-0.349	-0.364	-0.228
	(-1.38)	(-1.17)	(-1.50)	(-2.69)	(-2.04)	(-2.18)	(-0.84)
Adjusted R^2	0.670	0.749	0.765	0.697	0.705	0.676	0.432
N	33	33	39	39	39	39	21

The following equation is estimated:

$\hat{b}_t = f(\text{cost of equity proxies, control variables})$.

The dependent variable is the estimated pecking-order slope coefficient from Table A-2. ERP is the implied market equity risk premium at the year-end, estimated using analyst forecasts for the Dow 30 stocks from Value Line for 1968-1976 and from I/B/E/S for 1977-2001. RIPO is the annual average of initial returns of initial public offerings from Jay Ritter at http://bear.cba.ufl.edu/ritter/ipodata.htm. CEFD is the value-weighted average of the closed-end fund discount at the year-end from Malcolm Baker and Jeffrey Wurgler, who construct the series by combining several sources (Neal and Wheatley, 1962-1993; CDA/Weisenberger, 1994-1998; and the *Wall Street Journal*, 1999-2001). EWR is the equally weighted market returns from CRSP. SMB is the difference in the average return on portfolios of small stocks and portfolios of big stocks from Kenneth French. SEOAR is the annual average of market-adjusted returns from one day before to one day after the file date of seasoned equity offerings (SEOs) from Thomson Financial. The average announcement effect is calculated from 1980, the first year the file date is available for most SEOs. TAXR is the statutory corporate tax rate. RGDP is the real GDP

Table A-3. Continued
growth rate from the Bureau of Economic Analysis, Department of Commerce. UPTURN equals one for years between a "trough" and a "peak" declared by NBER, and zero for other years. INFLAT is the inflation rate from CRSP. DEFSP is the default spread calculated as the yield difference between Moody's Baa rated and Aaa rated corporate bonds at the year-end. An autoregressive term, AR (1), is included to account for residual serial correlation. The subscripts denote years. t-statistics are reported in parentheses.

independent variable, with time-series variations being explained by time dummies. Specifications (5) and (6) do not impose this restriction. The target leverage regression is estimated annually, and the annual averages of the coefficients are reported. The t-statistic for the average coefficient is calculated as the average coefficient divided by its time series standard deviation, following Fama and MacBeth (1973).

In all regressions, large firms, low R&D firms, and firms with more collateral as measured by tangibles, intangibles, and inventories, have higher target leverage, consistent with the static-tradeoff theory. Investment tax credits, which can serve as non-debt tax shields, decrease target leverage, also consistent with the tradeoff theory.

However, profitable firms have lower targets, and firms with large net operating loss carry forwards have higher targets. This is not consistent with the tradeoff prediction that profitable firms should have high leverage to reduce tax liability and agency costs associated with free cash flows, and firms with non-debt tax shields such as net operating loss carry forwards should prefer lower leverage. The pecking-order theory gains support here. According to the pecking-order theory, firms simply accumulate past profits and losses, with leverage being changed mechanically.

Dividend-paying firms have lower target leverage in all specifications. The static-tradeoff theory does not provide a clear prediction on whether dividend payers should have lower or higher target leverage. Tobin's Q switches signs in different

regressions. In specification (1) it increases target book leverage, while it reduces target leverage in other specifications, especially when market leverage is the dependent variable. The negative relation between Q and market leverage should not receive too much attention. As pointed out in Goyal, Lehn, and Racic (2002), this relation is largely mechanical. Capital expenditure also switches signs, possibly because of the competition between the pecking-order effect and the static-tradeoff effect.

Pecking-Order Tests with Partial Adjustment

We then estimate, annually, the pecking order equation with partial adjustment:

$$\Delta D_{it} = a_t + b_t DEF_{it} + c_t(TL_{it} - L_{it-1}) + u_{it}, \qquad \text{(A-2)}$$

where TL_{it} is the fitted value for firm i at the end of the fiscal year ending in calendar year t from target book leverage regression (1) in Table A-1. We also try using target leverage estimated using other regressions in Table A-1, and the major results are not affected.

Table A-2 reports the results. Partial adjustment indeed occurs in most years. However, the adjustment coefficient is below 12 percent for all years, suggesting that the adjustment speed is slow. During 1995-2001, the partial adjustment coefficient becomes negative, inconsistent with partial adjustment. Furthermore, the t-statistics for adjustment coefficients are small. However, pecking-order coefficients have much larger t-statistics. Shyam-Sunder and Myers (1999) report similar results, leading them to question the importance of the static-tradeoff theory.

After controlling for partial adjustment toward target leverage, we once again link the pecking-order coefficient to proxies for the cost of equity. Table A-3 reports the

Table A-4. Pecking-order tests controlling for changing firm characteristics

Year	b_t	$t(b_t)$	c_t	$t(c_t)$	d_t	$t(d_t)$	e_t	$t(e_t)$	f_t	$t(f_t)$	a_t	$t(a_t)$	N	Adj. R^2
1963	0.784	16.05	0.038	2.76	0.166	1.54	0.009	0.07	-0.080	-1.43	-0.006	-1.03	127	0.784
1964	0.794	45.60	-0.003	-0.50	0.066	1.33	0.039	0.71	0.022	1.35	-0.006	2.33	458	0.877
1965	0.853	49.42	-0.004	-0.73	0.008	0.14	-0.049	-0.55	0.039	2.01	-0.011	3.40	550	0.892
1966	0.896	77.72	0.005	0.97	0.011	0.29	-0.134	-2.43	0.013	1.27	-0.010	3.79	710	0.925
1967	0.614	47.81	-0.020	-5.11	-0.025	-0.42	-0.506	-7.16	0.099	6.07	0.004	0.93	1303	0.785
1968	0.683	61.86	-0.001	-0.31	-0.024	-0.44	-0.172	-2.91	0.071	4.86	-0.008	2.38	1549	0.835
1969	0.755	72.86	0.004	1.51	0.132	3.13	-0.032	-0.69	-0.018	-1.52	-0.023	-8.33	1901	0.831
1970	0.794	83.42	0.022	10.72	0.015	0.46	-0.152	-5.30	0.009	1.14	-0.005	2.72	2202	0.814
1971	0.699	77.28	0.004	1.31	0.142	4.59	-0.055	-2.34	0.009	1.10	-0.009	5.40	2486	0.776
1972	0.661	76.67	0.005	2.17	0.145	4.25	-0.091	-3.61	0.015	1.82	-0.003	1.64	2738	0.761
1973	0.819	123.12	0.014	10.07	0.054	2.40	-0.172	-7.15	-0.015	-2.32	0.014	-8.43	2975	0.874
1974	0.932	246.35	0.010	9.23	-0.030	-2.34	-0.039	-3.73	-0.010	-3.06	0.002	-2.72	3030	0.964
1975	0.900	179.49	-0.004	-1.86	-0.011	-0.78	-0.031	-3.25	0.005	1.35	-0.009	12.36	3081	0.934
1976	0.886	161.79	0.001	0.44	0.014	0.80	0.001	0.06	-0.009	-2.04	-0.006	-6.00	3017	0.919
1977	0.912	181.76	0.006	2.08	-0.001	-0.03	-0.015	-1.42	0.000	0.00	-0.005	5.71	2959	0.932
1978	0.877	159.84	0.003	1.09	0.059	3.25	0.009	0.72	-0.018	-3.62	0.000	-0.02	2858	0.920
1979	0.858	129.64	-0.011	-2.59	0.136	5.87	0.020	0.89	-0.022	-3.87	0.001	-0.60	2883	0.872
1980	0.763	102.72	-0.022	-7.45	0.015	0.60	-0.015	-0.82	-0.003	-0.56	-0.006	-3.83	2936	0.828
1981	0.636	69.99	0.005	1.50	0.259	7.35	0.076	2.75	0.013	1.54	-0.007	3.13	2877	0.699
1982	0.805	111.96	0.020	8.25	0.113	5.33	-0.005	-0.28	-0.010	-1.96	-0.011	-6.31	3062	0.843
1983	0.376	44.47	0.010	2.60	0.164	4.21	-0.132	-4.09	0.082	9.11	-0.005	-1.55	3044	0.509
1984	0.690	95.34	0.019	8.12	0.126	4.58	-0.039	-2.04	0.014	2.25	0.003	1.52	3109	0.783
1985	0.709	98.45	-0.003	0.80	0.088	3.18	-0.035	-1.77	0.019	2.79	-0.008	-3.37	3154	0.801
1986	0.636	75.27	0.015	3.79	0.093	2.54	-0.038	-2.04	0.015	1.97	-0.006	-2.27	3034	0.693
1987	0.725	91.41	0.009	2.79	0.019	0.57	-0.062	-3.28	0.008	1.33	-0.009	-3.58	3022	0.776

Table A-4. Continued

Year	b_t	$t(b_t)$	c_t	$t(c_t)$	d_t	$t(d_t)$	e_t	$t(e_t)$	f_t	$t(f_t)$	a_t	$t(a_t)$	N	Adj. R^2
1988	0.821	120.94	0.023	8.28	0.034	1.24	-0.056	-2.89	0.009	1.66	-0.003	-1.40	3107	0.854
1989	0.782	117.00	-0.003	-0.95	0.004	0.15	0.002	0.09	-0.012	-2.12	-0.005	-2.54	3048	0.838
1990	0.591	73.78	0.001	0.33	0.113	3.60	-0.058	-2.76	0.038	5.93	-0.001	-0.42	3005	0.699
1991	0.399	45.11	-0.031	-10.58	0.243	5.87	-0.202	-8.11	0.085	11.36	-0.004	-1.70	2997	0.504
1992	0.379	44.79	0.018	6.81	0.198	4.87	-0.128	-5.70	0.052	7.16	-0.006	-2.44	3103	0.459
1993	0.421	51.05	-0.004	-1.64	0.182	4.55	-0.065	-2.55	0.031	4.23	-0.003	-1.12	3337	0.509
1994	0.489	66.17	0.010	3.59	0.090	2.37	-0.060	-2.72	0.032	4.28	0.004	1.42	3678	0.594
1995	0.383	56.30	-0.018	-6.26	0.260	6.02	-0.209	-8.44	0.076	9.14	0.011	3.46	3905	0.532
1996	0.296	45.44	0.010	3.55	0.249	5.40	-0.219	-8.32	0.066	7.84	0.005	1.57	4147	0.409
1997	0.463	73.93	0.008	3.31	0.037	0.86	-0.106	-4.89	0.047	6.94	-0.001	-0.22	4480	0.612
1998	0.468	70.78	-0.004	-1.59	0.034	0.80	-0.078	-3.85	0.040	5.22	0.016	4.72	4592	0.594
1999	0.341	54.74	-0.016	-8.33	0.060	1.25	-0.144	-7.33	0.065	9.42	0.020	5.68	4403	0.480
2000	0.199	36.06	0.011	7.56	0.100	1.82	-0.073	-3.60	0.082	11.99	0.023	5.81	4251	0.317
2001	0.297	47.98	0.011	8.36	0.095	2.50	-0.083	-6.28	0.050	10.35	-0.016	-5.96	4186	0.409

Coefficients are computed annually from the cross-sectional regression:

$$\Delta D_{it} = a_t + b_t DEF_{it} + c_t \Delta Q_{it} + d_t \Delta TANG_{it} + e_t \Delta OIBD_{it} + f_t \Delta SALE_{it} + u_{it}.$$

The net debt issuance, ΔD_{it}, is the change in debt (Compustat item 181+10-35-79) scaled by beginning-of-year assets, $\Delta D_{it} = (D_{it} - D_{it-1}) / A_{it-1}$. The financing deficit, DEF_{it}, is the change in assets (6) minus the change in Compustat's adjusted value of balance sheet retained earnings (36) scaled by beginning-of-year assets, $DEF_{it} = ((A_{it}-A_{it-1})-(RE_{it}-RE_{it-1})) / A_{it-1}$. ΔQ_{it} is the change in the market-to-book ratio of assets, $\Delta TANG_{it}$ is the change in asset tangibility (8/6), $\Delta OIBD_{it}$ is the change in operating income before depreciation (13/6), and $\Delta SALE_{it}$ is the change in the log of net sales (12).

Table A-5. Time-series of the pecking-order slope coefficient controlled for changing firm characteristics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
ERP_{t-1}	4.323	3.305					
	(5.92)	(3.00)					
$RIPO_{t-1}$			-0.496				
			(-3.82)				
$CEFD_{t-1}$				0.506			
				(1.35)			
EWR_{t-1}					-0.122		
					(-1.22)		
EWR_{t+1}					0.109		
					(1.33)		
SMB_{t-1}						-0.153	
						(-0.87)	
$SEOAR_{t-1}$							-4.793
							(-0.55)
$TAXR_t$		0.843	1.655	1.873	1.788	1.889	1.605
		(1.47)	(4.33)	(3.54)	(3.76)	(3.77)	(1.07)
$RGDP_t$		0.413	0.342	-0.409	1.235	0.189	-1.435
		(0.37)	(0.36)	(-0.39)	(0.89)	(0.16)	(-0.51)
$UPTURN_t$		-0.006	0.013	0.044	0.064	0.076	0.139
		(-0.09)	(0.21)	(0.69)	(0.96)	(1.05)	(0.98)
$INFLAT_t$		1.289	2.367	1.353	2.070	2.160	4.553
		(1.18)	(2.97)	(1.28)	(2.08)	(2.15)	(1.36)
$DEFSP_{t-1}$		-6.022	-3.524	-5.603	-1.032	-3.991	-3.604
		(-0.91)	(-0.73)	(-0.92)	(-0.17)	(-0.67)	(-0.21)
CONSTANT	0.494	0.169	-0.069	-0.231	-0.300	-0.290	-0.371
	(13.74)	(0.76)	(-0.41)	(-1.02)	(-1.48)	(-1.31)	(-0.67)
AR (1)	-0.199	-0.178	-0.234	-0.420	-0.323	-0.340	-0.196
	(-1.11)	(-0.91)	(-1.34)	(-2.57)	(-1.87)	(-2.01)	(-0.72)
Adjusted R^2	0.662	0.746	0.761	0.694	0.700	0.674	0.419
N	33	33	39	39	39	39	21

The following equation is estimated:

$$\hat{b}_t = f(\text{cost of equity proxies, control variables}).$$

The dependent variable is the estimated pecking-order slope coefficient from Table A-4. ERP is the implied market equity risk premium at the year-end, estimated using analyst forecasts for the Dow 30 stocks from Value Line for 1968-1976 and from I/B/E/S for 1977-2001. RIPO is the annual average of initial returns of initial public offerings from Jay Ritter at http://bear.cba.ufl.edu/ritter/ipodata.htm. CEFD is the value-weighted average of the closed-end fund discount at the year-end from Malcolm Baker and Jeffrey Wurgler, who construct the series by combining several sources (Neal and Wheatley, 1962-1993; CDA/Weisenberger, 1994-1998; and the *Wall Street Journal*, 1999-2001). EWR is the equally weighted market returns from CRSP. SMB is the difference in the average return on portfolios of small stocks and portfolios of big stocks from Kenneth French. SEOAR is the annual average of market-adjusted returns from one day before to

Table A-5. Continued
one day after the file date of seasoned equity offerings (SEOs) from Thomson Financial. The average announcement effect is calculated from 1980, the first year the file date is available for most SEOs. TAXR is the statutory corporate tax rate. RGDP is the real GDP growth rate from the Bureau of Economic Analysis, Department of Commerce. UPTURN equals one for years between a "trough" and a "peak" declared by NBER, and zero for other years. INFLAT is the inflation rate from CRSP. DEFSP is the default spread calculated as the yield difference between Moody's Baa rated and Aaa rated corporate bonds at the year-end. An autoregressive term, AR (1), is included to account for residual serial correlation. The subscripts denote years. t-statistics are reported in parentheses.

results. Firms still prefer debt when the cost of equity is high and prefer equity when the cost of equity is low. The statistical and economic significance is still very impressive.

Pecking-Order Tests with Changing Firm Characteristics

The estimated target leverage may be contaminated by estimation errors. One way to resolve this problem is to include firm characteristics directly in the pecking order equation. Either lagged values of firm characteristics or changes in firm characteristics can be included. Because the results are not sensitive to whether we include lagged firm characteristics, we only report results when changes in firm characteristics are included in the pecking order equation:

$$\Delta D_{it} = a_t + b_t DEF_{it} + c_t \Delta Q_{it} + d_t \Delta TANG_{it} + e_t \Delta OIBD_{it} + f_t \Delta SALE_{it} + u_{it}, \quad \text{(A-3)}$$

where ΔQ_{it} is the change in the market-to-book ratio for assets for firm i from the fiscal year ending in calendar year t-1 to the fiscal year ending in t, $\Delta TANG_{it}$ is the change in tangible assets as a fraction of total assets, $\Delta OIBD_{it}$ is the change in operating income before depreciation scaled by assets, and $\Delta SALE_{it}$ is the change in the log of net sales.

Table A-4 reports the results. Some observations are lost because data are required for additional independent variables. The financing deficit has the dominant explanatory power. The increase in Tobin's Q increases the proportion of the financing deficit funded with net debt in some years, while it decreases the proportion in other years. The change

in tangibility and net sales are mostly positively linked to net debt, while the change in profitability is mostly negatively linked to net debt. Table A-5 links the pecking-order coefficient to the cost of equity. The major results remain unchanged. The cost of equity greatly helps explain the changing pecking-order behaviors even after controlling for changing firm characteristics.

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Rongbing Huang received a Bachelor of Arts degree in economics from the People's University of China in 1994. He came to the United States in 1996, and received a Master of Science degree in agricultural and applied economics from Virginia Polytechnic Institute and State University in 1998.

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